



LOUISVILLE-SOUTHERN INDIANA OHIO RIVER BRIDGES PROJECT

PRELIMINARY TRAFFIC AND REVENUE OPTIONS STUDY

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FINAL REPORT

Prepared by



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A S S O C I A T E S



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EXECUTIVE SUMMARY

The Louisville-Southern Indiana Ohio River Bridges (LSIORB) project is a construction and reconstruction project being undertaken jointly by the Kentucky Transportation Cabinet (KYTC) and the Indiana Department of Transportation (INDOT). The purpose of the project is to address long-term cross-river transportation needs in the Louisville metropolitan area.

The LSIORB project consists of six highway sections, as shown in **Figure E.1**, including construction of two new bridges. A new 6-lane downtown bridge would carry northbound I-65 traffic from downtown Louisville, and another new 6-lane bridge, the East-End Bridge, would link an extended KY 841 with IN 265. The existing I-65 bridge would be reconfigured to serve southbound traffic. With construction of the two new bridges and reconfiguration of the existing downtown bridge, roadway work will be completed for the approaches to Kentucky and Indiana. In addition to these improvements, the existing Kennedy Interchange, where I-64, I-65 and I-71 converge in downtown Louisville, would be reconstructed south of its current location.

KYTC has contracted with Wilbur Smith Associates (WSA) to conduct a preliminary traffic and revenue options study assuming the tolling of several alternatives for the LSIORB project. In this study, it was assumed that the project would allow for all electronic toll collection, with a gantry located on each toll collection location. Different combinations of tolled and non-tolled bridges were evaluated for four bridges crossing the Ohio River; I-64, US 31, I-65 and East-End bridges. An option of tolling the Kennedy

Interchange was also analyzed. In all, eight tolling alternatives were evaluated as shown in **Table E.1**. For the bridge toll alternatives, bidirectional toll collection was assumed. For the Kennedy Interchange, toll collection was assumed at all exit points, ensuring that all users of the facility would be tolled.

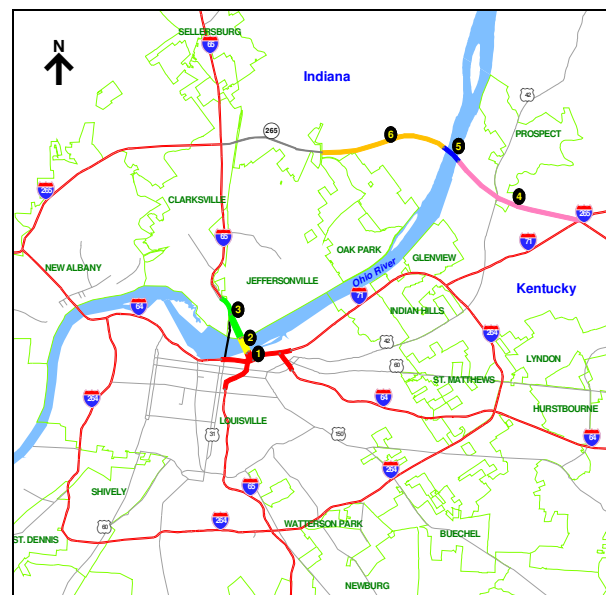


Figure E.1 LSIORB Project

Table E.1 Toll Alternatives

Toll Alternative	Bridge (Ohio River Crossing)				Kennedy Interchange
	I-64	US 31	I-65	East-End	
1	♦	♦	♦	♦	
2		♦	♦	♦	
3	♦		♦	♦	
4		♦	♦		
5			♦	♦	
6			♦		
7				♦	
8					♦

♦ Tolled



LOUISVILLE-SOUTHERN INDIANA OHIO RIVER BRIDGES PROJECT PRELIMINARY TRAFFIC AND REVENUE OPTIONS STUDY

A travel demand modeling application was used to develop traffic and revenue forecasts. At the toll collection locations, annual toll transactions were estimated based on traffic volume forecasts derived from a travel demand model. Toll operations and maintenance (O&M) costs were estimated based on the toll transactions. Annual gross and net toll revenues were estimated from the toll transactions and the toll operations and maintenance costs.

The travel demand model indicates that the LSIORB project would result in significant travel time savings for certain through and local trips as compared to the travel time experienced by motorists in the existing condition without the project. Following are some examples of travel time and travel distance savings in 2030 for toll alternative 1 (tolling all bridges) with the \$2.00 base toll rate for passenger vehicles.

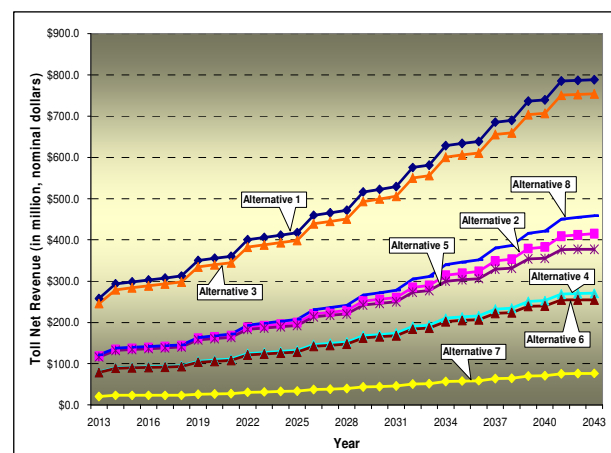
A worker who lives in Jeffersontown commutes to his job at the Clark Maritime Center in Indiana. Taking the new I-65 bridge will save him 14 minutes, which translates to a net saving of approximately \$0.40 after the toll. Another worker commuting from his home in Clarksville to the Ford Truck plant in Louisville will see his commute time reduced by approximately 26 minutes and his travel distance by 4 miles. The net savings after the toll will be about \$2.90.

In another example, a mother from Jeffersontown travels with her daughter to a game at Woerle Field in Jeffersonville, Indiana, after school ends at 3 PM. Taking the new East-End Bridge will result in a 15 minutes time saving. The net savings after the toll will be about \$0.50.

A truck from Scottsburg, Indiana passes through the Louisville area on its way to Cincinnati via I-65 and I-71. Taking the new East-End Bridge will reduce his trip by approximately 5 miles, resulting in a time saving of 31 minutes. The net savings after the toll will be approximately \$14.80.

Overall, the LSIORB project for toll alternative 1 would result in savings of approximately 30 million vehicle hours in 2030 as compared to the no-build condition.

The eight toll alternatives would produce varying toll revenues. For the \$2.00 (2007) base toll rate, **Figure E.2** presents the comparison of net toll revenues by toll alternative in nominal dollars for the 30-year projection period beginning in the opening year of 2013. Alternatives 1 and 3 would result in the highest toll revenues for all toll rates tested. Alternative 7 would record the lowest revenues among toll alternatives. Alternatives 4 and 6 show similar revenues for all toll rates tested.



**Figure E.2 Annual Toll Net Revenues
(\$2.00 (2007) Base Toll Rate)**

In conclusion, this study shows that the LSIORB project is expected to generate travel time benefits for the cross-river traffic. Tolling options for the project would generate new revenues which may assist in partially funding the project. Should KYTC decide to pursue some form of public or private financing for the project, a more detailed comprehensive traffic and revenue study would be required.



CHAPTER 1

INTRODUCTION

1.1 BACKGROUND AND OBJECTIVES

The Louisville-Southern Indiana Ohio River Bridges (LSIORB) project is a construction and reconstruction project being undertaken jointly by the Kentucky Transportation Cabinet (KYTC) and the Indiana Department of Transportation (INDOT). The purpose of the project is to address long-term cross-river transportation needs in the Louisville metropolitan area. In September 2003, the Federal Highway Administration (FHWA) issued a Record of Decision (ROD) that identified the preferred alternative in the Final Environmental Impact Statement (FEIS) as the selected alternative for providing two new Ohio River bridges and connected approaches, including the reconstruction of the Kennedy Interchange (I-64, I-65 and I-71) in downtown Louisville.

The LSIORB project includes construction of a new 6-lane downtown bridge for northbound I-65 traffic. The existing I-65 bridge will be reconfigured to serve southbound traffic. Another new 6-lane bridge, the East-End Bridge, will link the extended KY 841 with IN 265 in Indiana. With construction of the two new bridges and reconfiguration of the existing downtown bridge, roadway work will be completed for the approaches to Kentucky and Indiana. In addition, the existing Kennedy Interchange, where I-64, I-65 and I-71 converge in downtown Louisville, will be reconstructed south of the current location.

The estimated project cost is approximately \$3.9 billion based on the projected year of expenditure (inflation adjusted) (*Source: Louisville-Southern Indiana Ohio River Bridges Project: Long-Term Planning Report, Kentucky Transportation Cabinet, December 2006*). Approximately, 70 percent of the project cost has been allocated to KYTC and the remaining 30 percent to INDOT. Over the next 18 years, funding for the LSIORB will account for an average 13 percent of all highway spending by KYTC and in some specific years exceed 20 to 30 percent of all spending. Clearly, this will pose challenges to KYTC. Tolling one or more bridges/approaches may generate new revenues which may assist in partially or wholly funding the Project.

KYTC has requested Wilbur Smith Associates (WSA) to conduct a preliminary traffic and revenue study for the project with the most current data sets available including the 2000 Census, new future year socioeconomic forecasts, and transportation and land-use forecasts. This study utilizes the latest travel demand model developed by the Kentuckiana Regional Planning and Development Agency (KIPDA). In addition, this study involves specific data collection such as traffic counts and travel time studies to support the modeling effort. The purpose of this study is to provide traffic and revenue forecasts assuming the tolling of several alternatives for the LSIORB project.



1.2 PROJECT DESCRIPTION

Figure 1.1 depicts the regional location of Louisville. As seen in the figure, the Louisville urban area is served by I-65, which carries the north-south traffic, and by I-64, which accommodates the east-west traffic across the region. I-71 runs northeast of Louisville, serving communities along the interstate and eventually connects with I-75, which leads to Cincinnati, Ohio.

The Louisville urban area is also served by a loop, I-264, which begins at I-64 immediately east of the Sherman Minton Bridge (or I-64 Bridge) and ends at I-71 in the northeast. The area is also served by an outer loop, I-265, which connects I-65 in the south to I-71 in the northeast. I-265 on Indiana side connects I-64 northwest of the Sherman Minton Bridge to I-65 in Clark County. Currently, there are three bridges which serve traffic crossing the Ohio River: I-64, US 31 and I-65 bridges.

Figure 1.2 presents the proximity of Louisville to other major cities in the region. The proximity is expressed by the roadway miles from Louisville to other major cities. Also shown in the figure is the year 2000 population for these cities. Lexington, Kentucky, is the closest city, located 77 miles east of Louisville with a population of more than 260,000. Indianapolis, Indiana, is the largest city located within a little over 100 miles from Louisville with a population of more than 780,000.

Regionally, Chicago, Illinois, is the most populated city with about 2.9 million, located about 300 miles from Louisville. Nashville, Tennessee, is located about 180 miles south of Louisville with a population of about 550,000. I-65 is the main north-south artery that connects Chicago, Indianapolis, Louisville and Nashville.

The LSIORB Project consists of six major construction sections as described below and graphically represented in **Figure 1.3**.

- **Section 1 – Kennedy Interchange**
Reconstruction of the Kennedy Interchange to south of the current location
- **Section 2 – I-65 Downtown Bridge**
Construction of a new six-lane bridge to serve northbound I-65 traffic and Reconfiguration of the existing bridge to serve southbound I-65 traffic
- **Section 3 – Downtown Indiana Approach**
Roadway work to accommodate the newly configured northbound and southbound I-65 traffic
- **Section 4 – East-End Kentucky Approach**
Extension of KY841 to the new East-End Bridge
- **Section 5 – East-End Bridge**
Construction of a new 6-lane bridge to link the extended KY 841 with I-265 in Indiana
- **Section 6 – East-End Indiana Approach**
Extension of IN 265 to connect the East-End Bridge

The six sections are anticipated to be designed and constructed between 2008 and 2024. The current schedule calls for completion of the East-End Bridge and related roadways by 2013 and construction of the I-65 Downtown Bridge by 2019. The reconstruction of the Kennedy Interchange would be completed by 2024.



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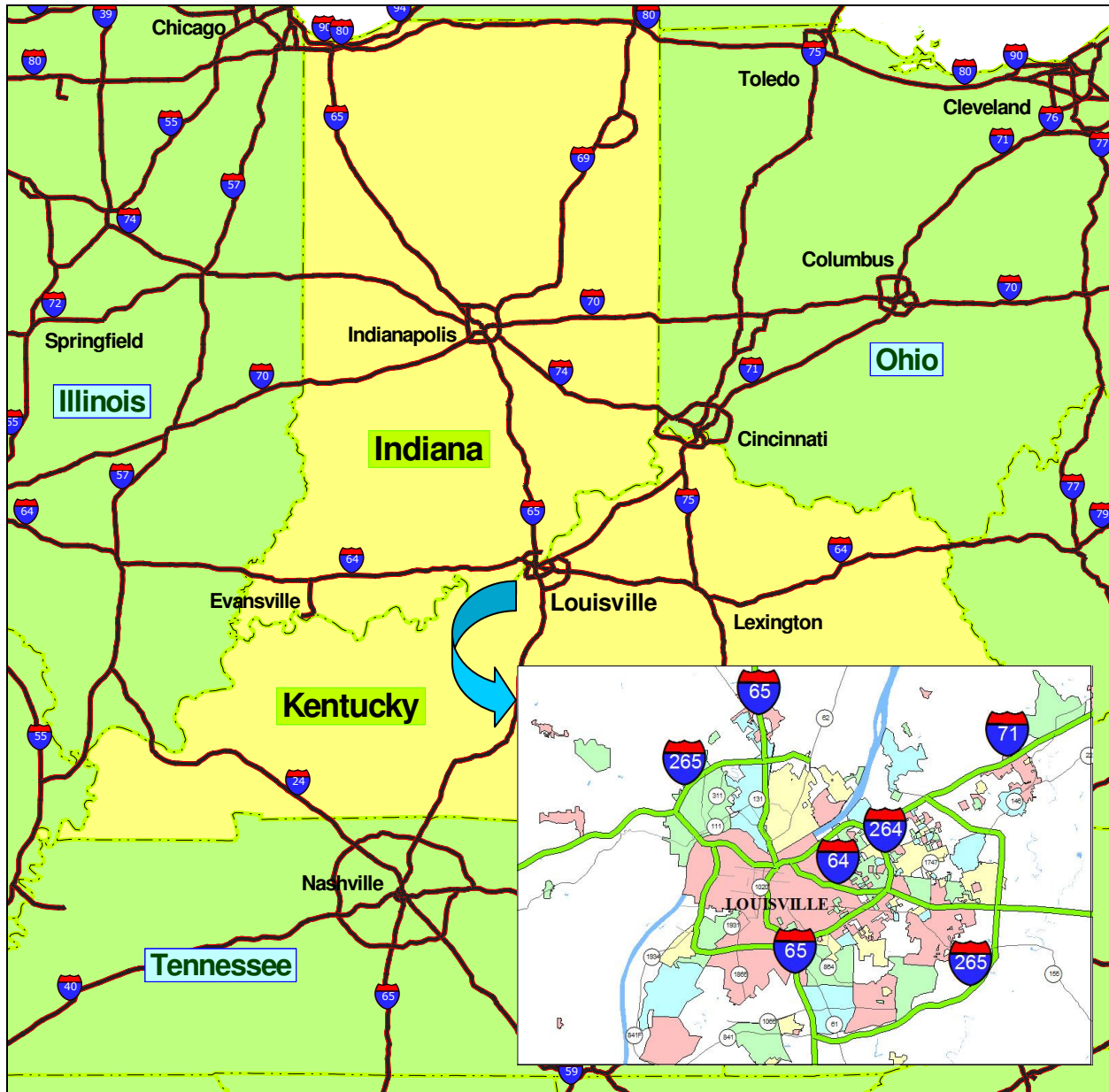


Figure 1.1 Regional Location of Louisville



LOUISVILLE-SOUTHERN INDIANA OHIO RIVER BRIDGES PROJECT PRELIMINARY TRAFFIC AND REVENUE OPTIONS STUDY

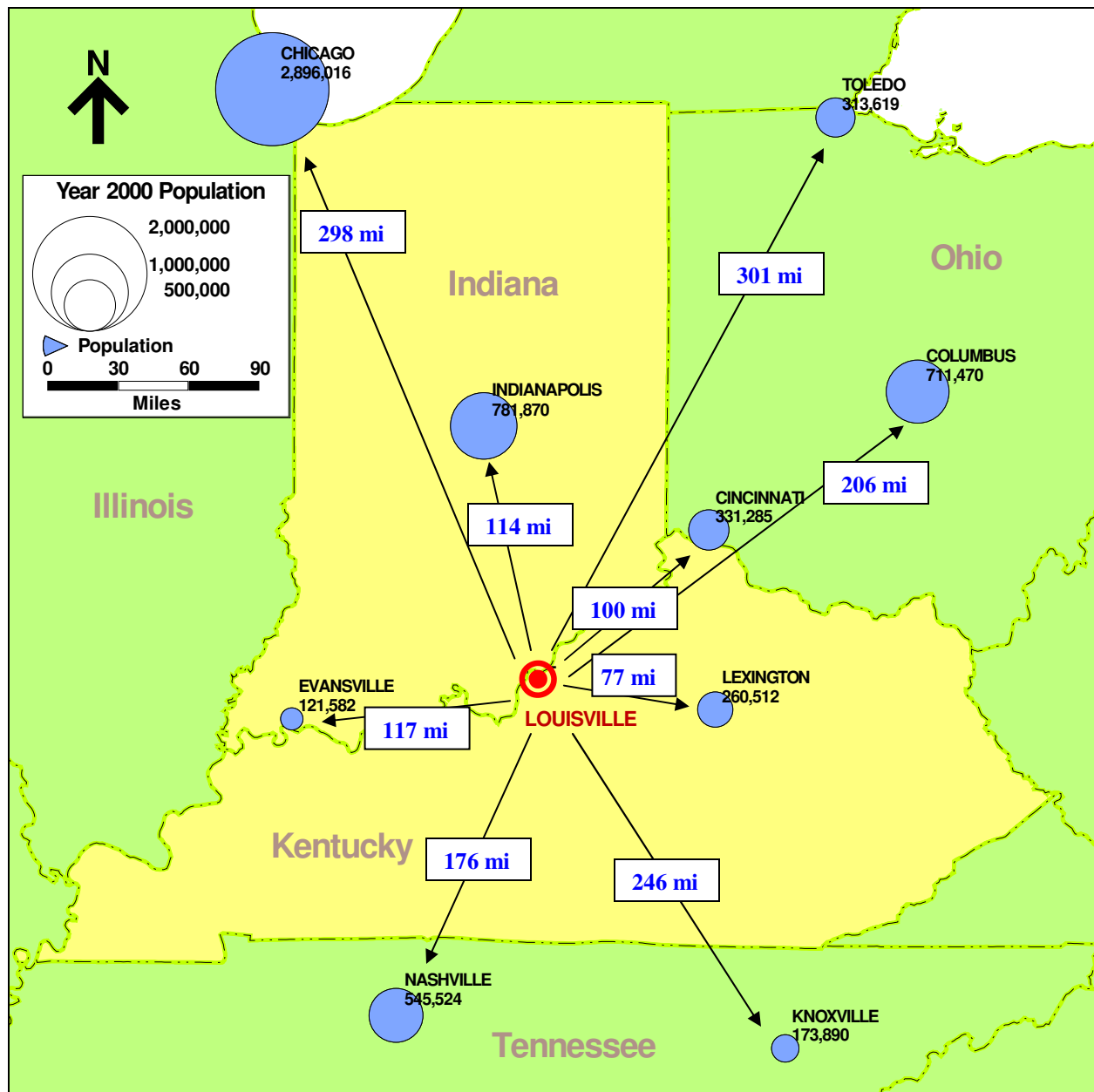


Figure 1.2 Proximity to Major Cities in the Region





1.3 ORDER OF PRESENTATION

This report provides the results of the study in the following chapters:

Chapter 2 presents traffic characteristics and trends in the study area. Historical traffic statistics for major highways are presented and discussed. The chapter also summarizes the results of travel time runs conducted by WSA to investigate the congestion levels of the study area.

Chapter 3 discusses the regional demographic and economic characteristics of the study area. This chapter explores the historical trends of key demographic variables and economic indicators in the region.

Chapter 4 presents the proposed toll collection systems and their features. This chapter also describes the tolling scenarios considered for this study, as well as toll rate assumptions.

Chapter 5 reports the methodology used to develop traffic and revenue forecasts for the toll alternatives. A comparative toll rate analysis is presented, which reviews the assumed toll rates against the toll rates charged at a representative set of toll facilities in the United States. Next, traffic and revenue forecasts using the assumed toll rates are provided for a 30-year projection period beginning in the assumed opening year of 2013.



CHAPTER 2

TRAFFIC CHARACTERISTICS AND TRENDS

This chapter provides an analysis of traffic trends in the major corridors near the proposed bridges. Historic traffic trends and patterns on the existing bridges are included, along with samples of current travel times in the bridge corridors.

2.1 TRAFFIC TRENDS

Figure 2.1 shows the location of the existing Ohio River road bridges in the Louisville area. Because the river is a natural barrier to traffic, with no alternatives for thirty miles or more in each direction, the river may be seen as a “screenline” for evaluating potential toll traffic. The presence of existing bridges further aids the toll evaluation effort, as the baseline demand for cross-river vehicle travel can be measured with traffic counts across those bridges.

Three road bridges cross the Ohio River in the Louisville area. The I-65 bridge, also known as the John F. Kennedy Memorial Bridge, carries the mainline of Interstate 65 through downtown Louisville into Jeffersonville, Indiana. The I-65 bridge is configured with three southbound lanes and four northbound lanes. I-65 continues north to Chicago and south to Mobile, Alabama, carrying significant through traffic. The I-65 bridge carries the highest traffic volume among the three bridges. The Average Daily Traffic (ADT) on the bridge grew from 97,000 vehicles in 1990 to 124,800 vehicles in 2000, at an average annual percent change (AAPC) of 2.6 percent.

Located immediately west of I-65, the George Rogers Clark Memorial Bridge carries US 31 across the Ohio River. US 31 provides a direct connection between the Louisville and Jeffersonville downtown areas and carries two lanes in each direction. The bridge experienced a modest increase in ADT from 18,900 vehicles in 1992 to 19,600 vehicles in 2000 with an AAPC of 0.5 percent. The bridge has a narrow right-of-way, thus the limited capacity may have caused the modest growth.

The I-64 bridge, also known as the Sherman Minton Memorial Bridge, crosses the Ohio River approximately four miles west of I-65. The I-64 crossing is a double-decked steel arch bridge carrying three lanes in each direction, linking the Louisville area with New Albany, Indiana. The bridge carried 51,000 vehicles in 1990 and 86,300 vehicles in 2000, an increase of 5.4 percent AAPC.



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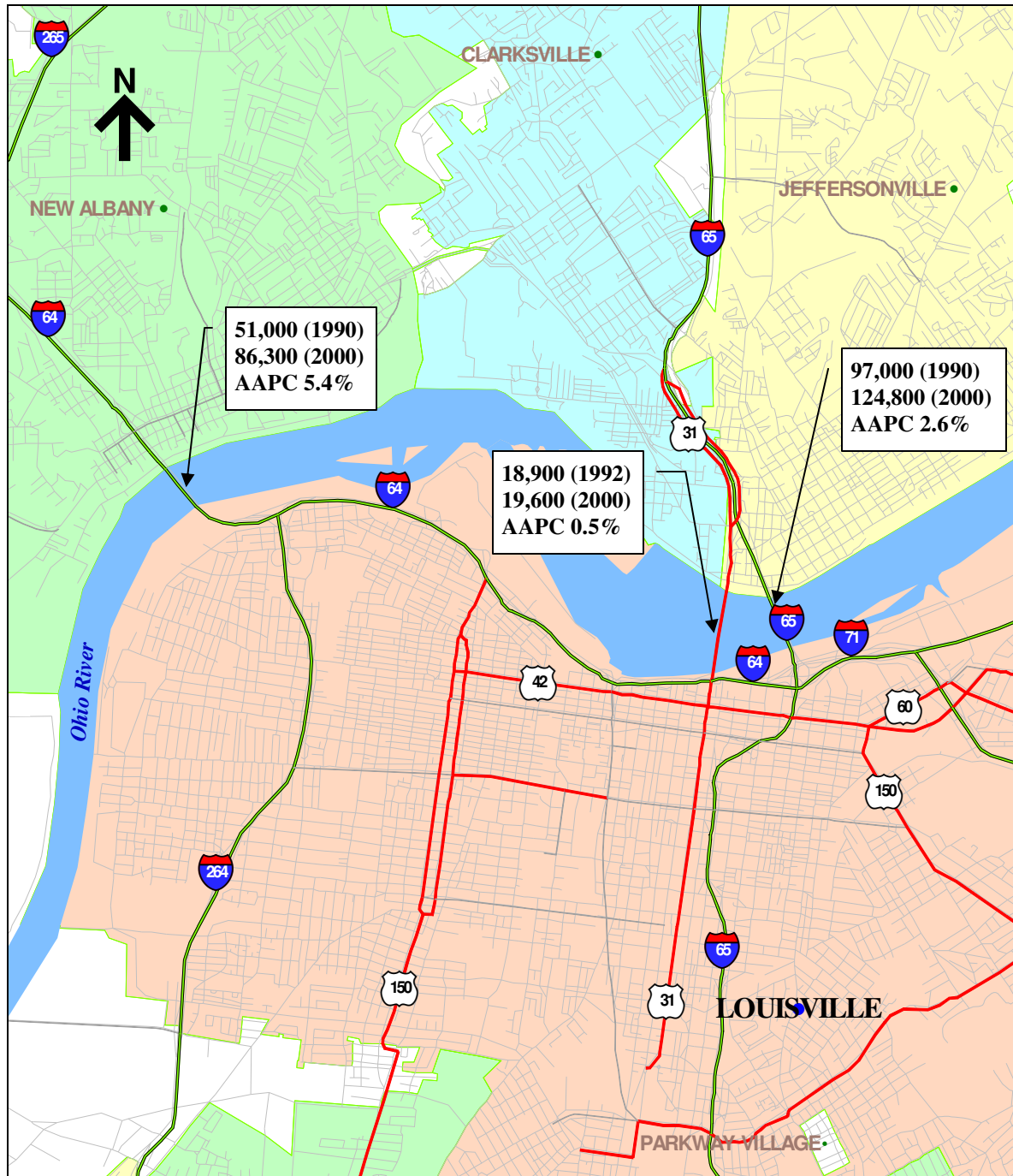


Figure 2.1 Screenline Location



LOUISVILLE-SOUTHERN INDIANA OHIO RIVER BRIDGES PROJECT PRELIMINARY TRAFFIC AND REVENUE OPTIONS STUDY

Figure 2.2 shows traffic trends since 1990 for the three bridges. I-65 carries more traffic than the other bridges combined, and continues to show traffic growth. I-64 has shown rapid growth, with its volume nearly doubling since 1990. US 31 traffic has generally held steady at approximately 20,000 vehicles per day, likely indicative of its lower capacity and lack of direct connections to the area's limited access highways.

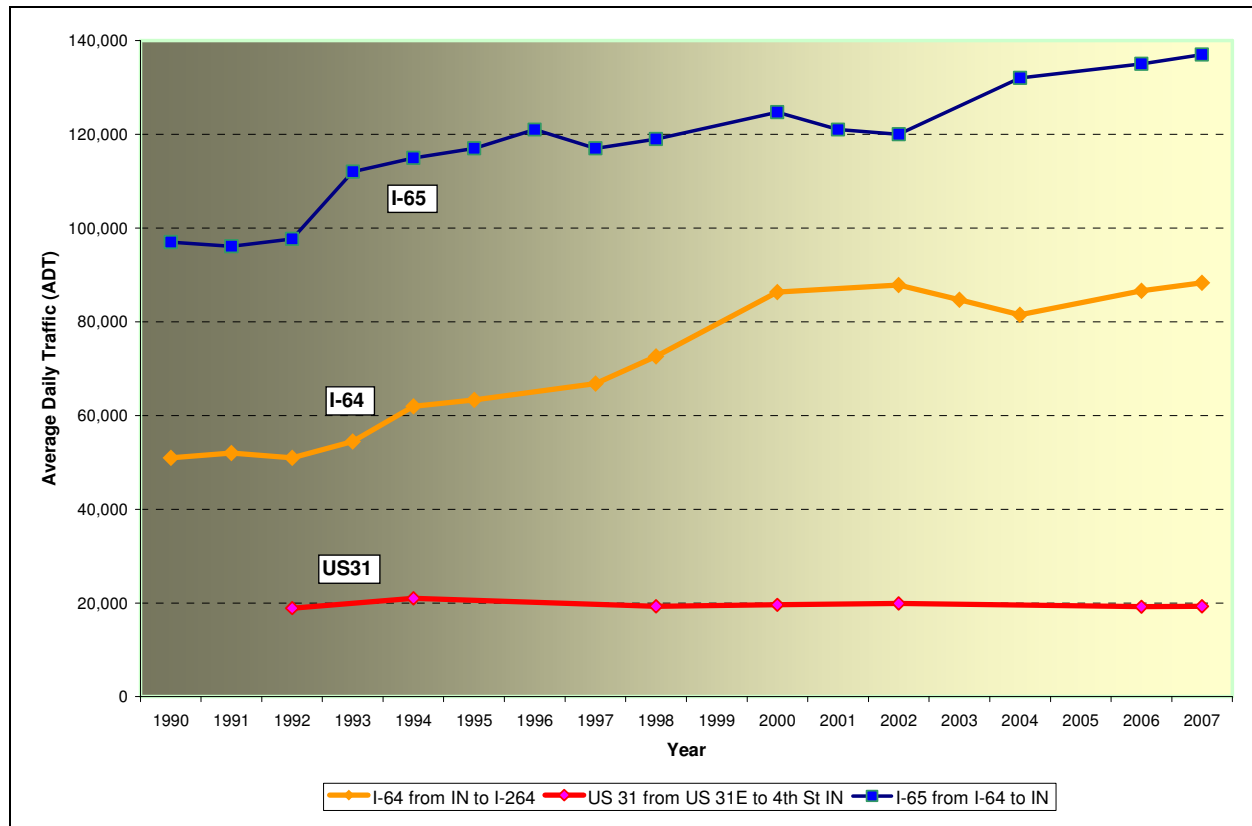


Figure 2.2 Historical Screenline Traffic



2.2 MONTHLY TRAFFIC VARIATION

Figure 2.3 illustrates estimated seasonal traffic variation on the three bridges. The monthly average daily traffic estimates were calculated using Kentucky Transportation Cabinet factors for urban interstates for I-64 and I-65, and the factor for urban general routes for US 31. The estimates show strong traffic volumes year round, with minimal seasonal fluctuation on the interstate routes, and almost negligible fluctuation on the US 31 crossing.

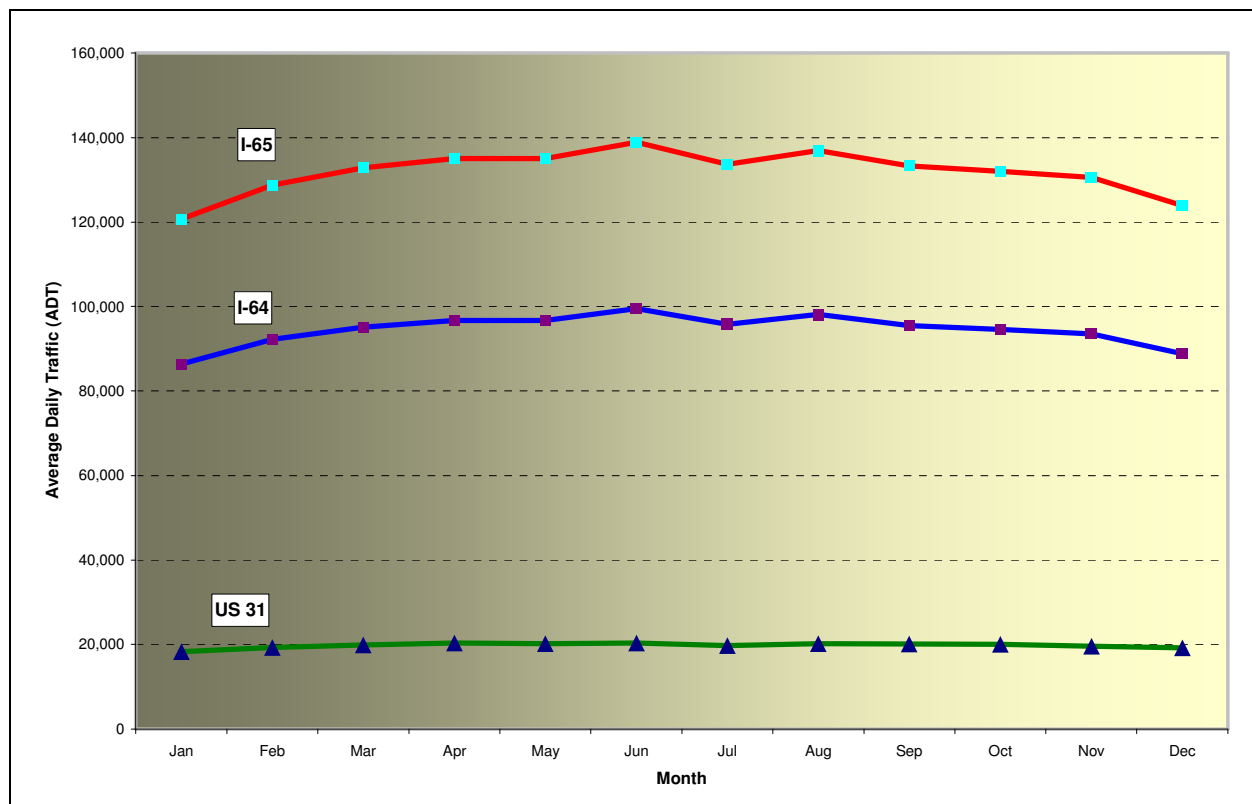


Figure 2.3 Monthly Traffic Variations on Screenline Traffic



2.3 HOURLY TRAFFIC VARIATION

Figures 2.4 through 2.6 show hourly traffic variation on the three Ohio River crossings in the Louisville area. Based on traffic counts conducted during the summer of 2007, the hourly fluctuation graph shows significant contrast among the three crossings. **Figure 2.4** presents hourly traffic trends on the I-65 bridge. For the southbound traffic, the I-65 bridge demonstrated peaking between 6 a.m. and 9 a.m. and 2 p.m. to 3 p.m., and a lesser peak during the midday hours. For the northbound traffic, strong peaking was observed between 4 p.m. and 6 p.m.

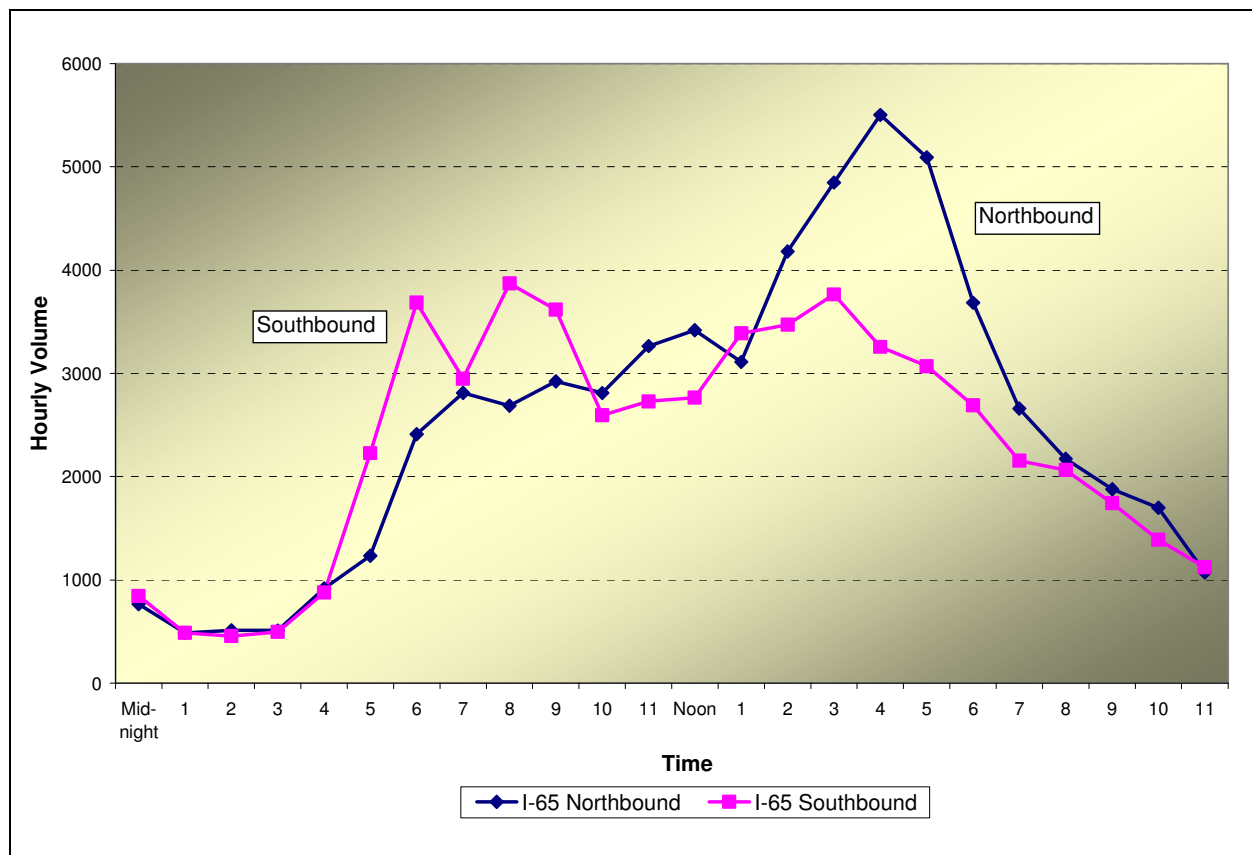


Figure 2.4 Hourly Traffic Variations on the I-65 Bridge



Figure 2.5 presents hourly traffic trends on the I-64 bridge. For the eastbound traffic, the I-64 bridge demonstrated strong peaking between 6 a.m. and 8 a.m. For the westbound traffic, the highest peak was observed between 4 p.m. and 5 p.m. The hourly patterns on the I-64 bridge show that no obvious midday peak was observed.

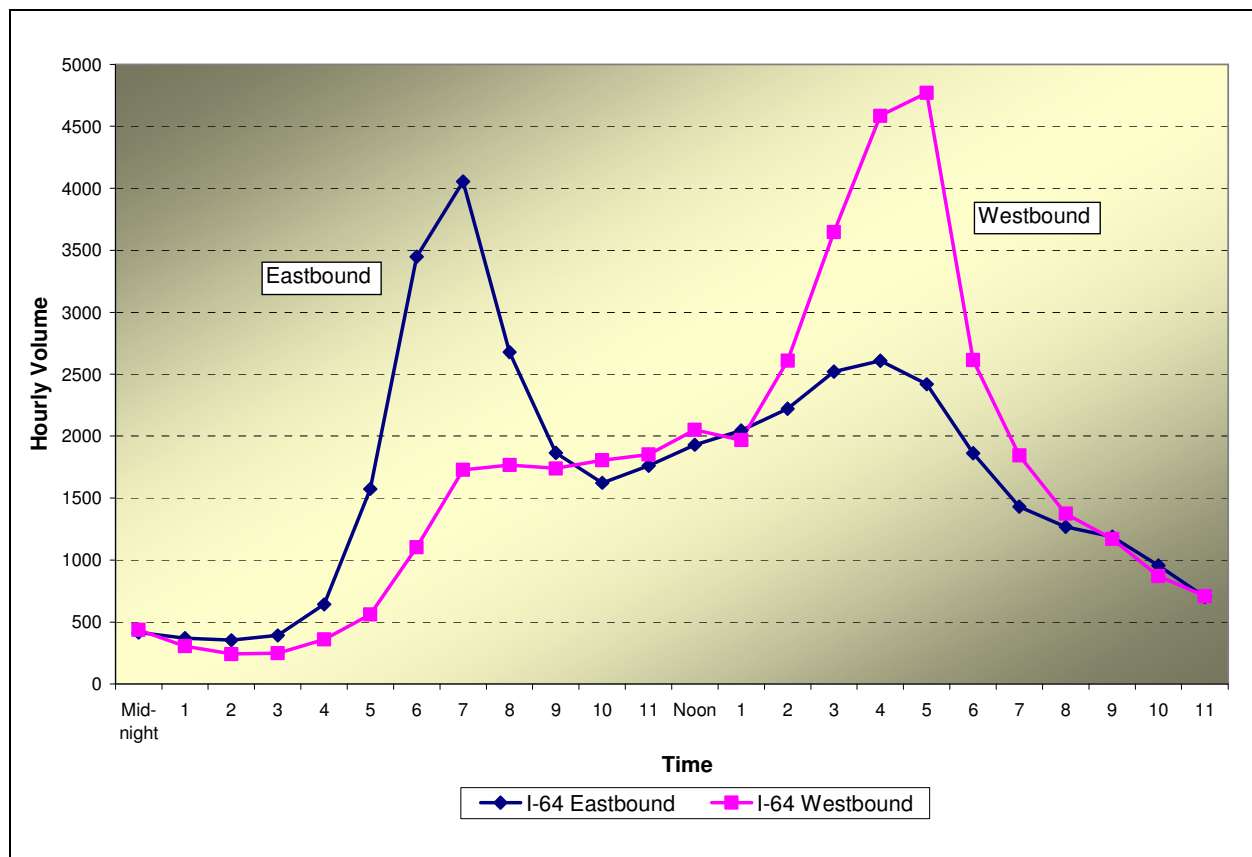


Figure 2.5 Hourly Traffic Variations on the I-64 Bridge



Figure 2.6 presents hourly traffic trends on the US 31 bridge. The southbound traffic peaks between 7 a.m. and 8 a.m. For the northbound traffic, strong peaking was observed between 4 p.m. and 5 p.m. A lesser peak was observed during the midday hours. The hourly patterns on all three bridges demonstrate that the outbound traffic volumes during the p.m. peak hours are higher than the inbound traffic during the a.m. peak hours.

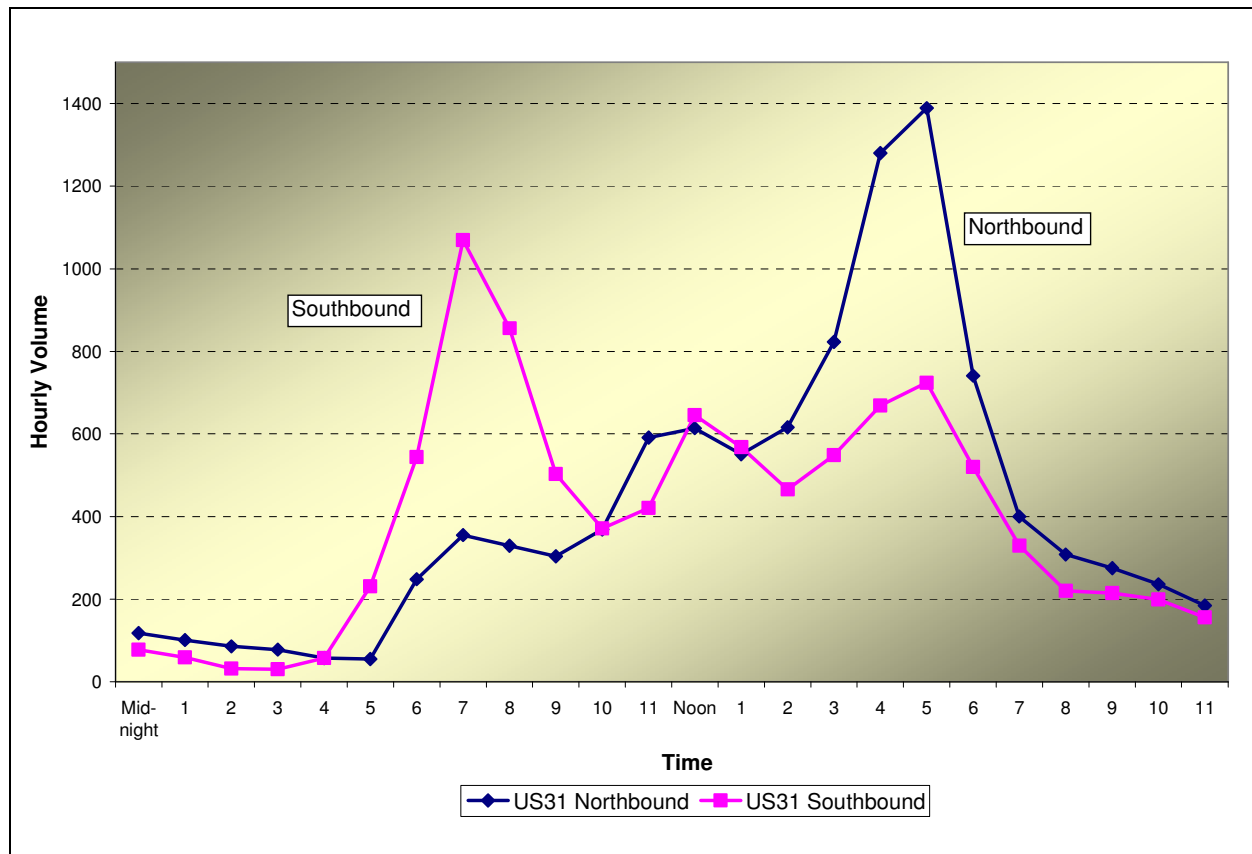


Figure 2.6 Hourly Traffic Variations on the US 31 Bridge



2.4 VEHICLE CLASSIFICATION

Figures 2.7 through 2.9 show the vehicle class split for the three Ohio River crossings. The charts were derived from the hourly traffic counts conducted for two weekdays in August 2007. The vehicle classifications on the I-65 bridge are shown in **Figure 2.7**. Passenger car traffic accounts for approximately 76% of vehicles crossing the I-65 bridge northbound. Heavy-duty trucks total about 20% of all northbound traffic. The vehicle composition for southbound traffic is similar to that for northbound traffic; 78% for passenger cars and 17% for heavy trucks.

Figure 2.8 shows the vehicle compositions on the I-64 bridge. The proportion of passenger cars is higher than that on the I-65 bridge; about 84% eastbound and approximately 88% westbound. Heavy trucks account for about 8% of all traffic in both directions. **Figure 2.9** shows the vehicle classification on the US 31 bridge. The US 31 bridge is mainly used by passenger cars, about 98% of all traffic in both directions.

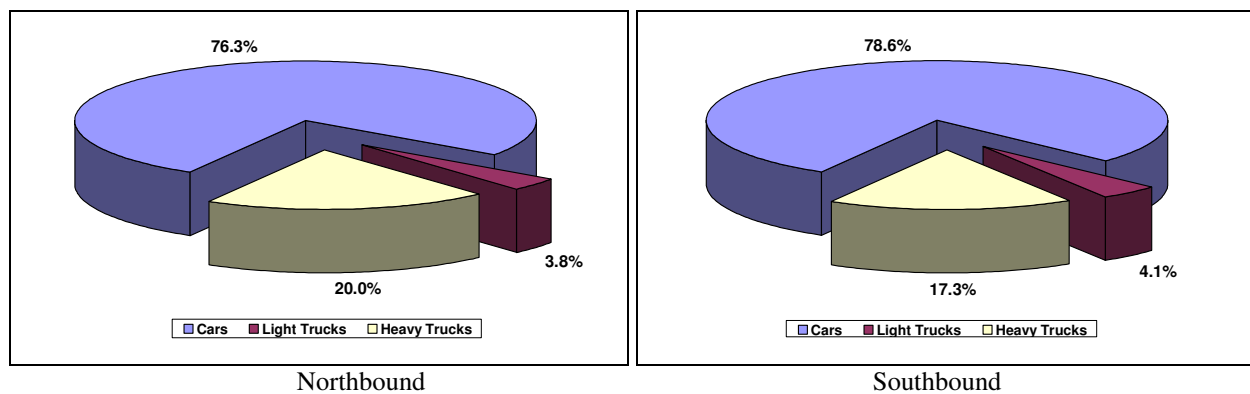


Figure 2.7 Vehicle Classification on I-65 Screenline Traffic

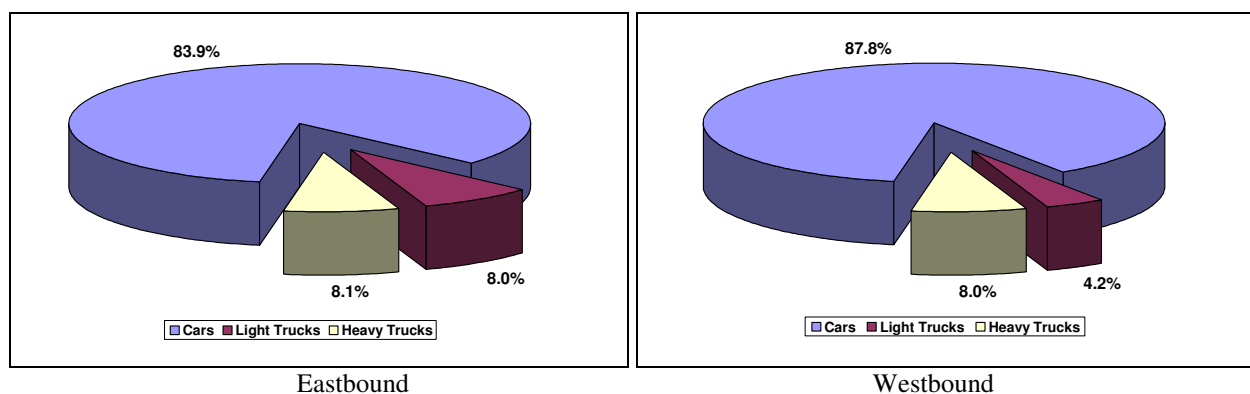


Figure 2.8 Vehicle Classification on I-64 Screenline Traffic

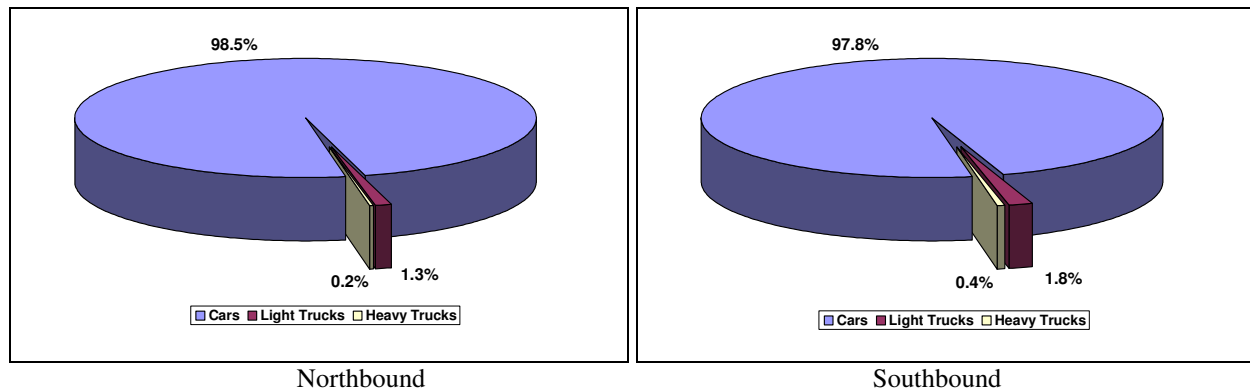


Figure 2.9 Vehicle Classification on US 31 Screenline Traffic

2.5 SPEED RUNS

Speed and delay runs were conducted on all screenlines (I-64, US 31 and I-65 bridges), as well as the urban interstates surrounding the Louisville metro area, to better understand the congestion levels in the study area. The runs were conducted on August 15, 16, 17 and 20 in 2007 on I-65, US 31, I-64, I-264 and I-265 in the vicinity of the Louisville metro area. Several runs were conducted in each direction, during the a.m., p.m., and midday time periods. A special Global Positioning System (GPS) device was used to collect the real-time data for each route. The data included vehicle heading, coordinates, the distance traveled, local time, and vehicle speed.

Figures 2.10 and 2.11 show the results of speed runs conducted in a.m. and p.m. peak hours, respectively. The figures are color-coded with the lowest travel speed observed. **Figure 2.10** indicates that the I-65 and US 31 bridges experienced high congestion during the a.m. peak hours. The congestion was caused by the southbound traffic traveling toward downtown Louisville. Traffic going through the Kennedy Interchange experienced significant delays. Congestion effects were evident on I-64 and I-71 leading to the Kennedy Interchange. On the other hand, the I-64 bridge showed less congestion with the speeds ranging from 41 to 50 mph.

Figure 2.11 illustrates the lowest speeds observed during the p.m. peak period. The figure indicates that the I-65 bridge experienced significant congestion. The congestion level of I-65 and I-64 near downtown was also severe during this period. Conversely, other urban interstates, including I-64 to the west and I-264, did not indicate high congestion. For the a.m. peak period, the average observed speed on the I-64, US 31 and I-65 bridges was 41.2 mph, while the average speed for the p.m. peak period was 37.7 mph. The speed on the rural interstates covered by the speed runs was recorded at 56 mph during the a.m. and p.m. periods. The speeds on urban interstates during the a.m. peak hours were averaged at about 56.3 mph. The average speed on urban interstates during the p.m. peak period was recorded at 51.7 mph. This observation indicates that the Louisville area experienced more congestion in the p.m. peak period than the a.m. peak period.



LOUISVILLE-SOUTHERN INDIANA OHIO RIVER BRIDGES PROJECT
PRELIMINARY TRAFFIC AND REVENUE OPTIONS STUDY

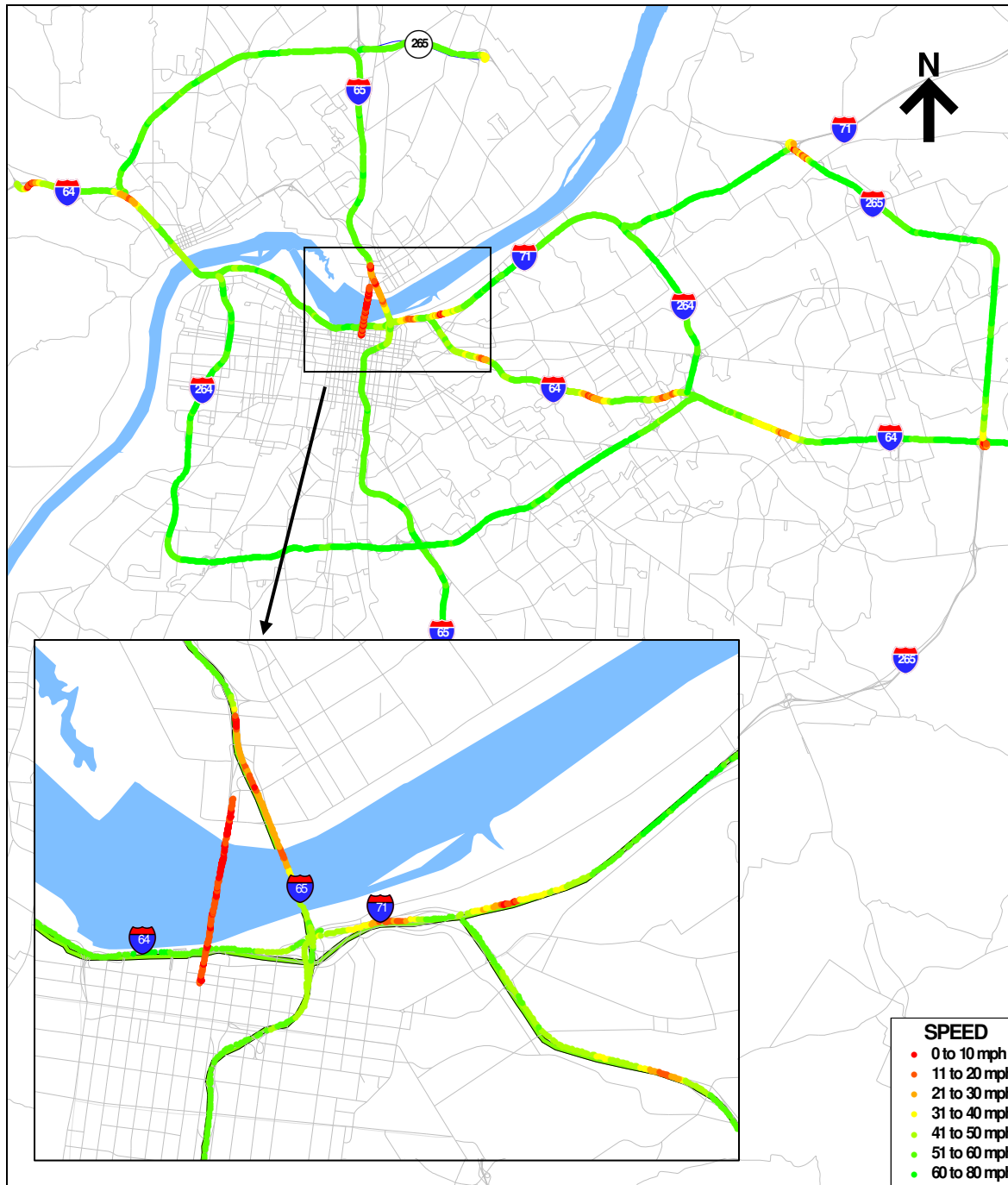


Figure 2.10 Speed Run Results – A.M.



LOUISVILLE-SOUTHERN INDIANA OHIO RIVER BRIDGES PROJECT PRELIMINARY TRAFFIC AND REVENUE OPTIONS STUDY

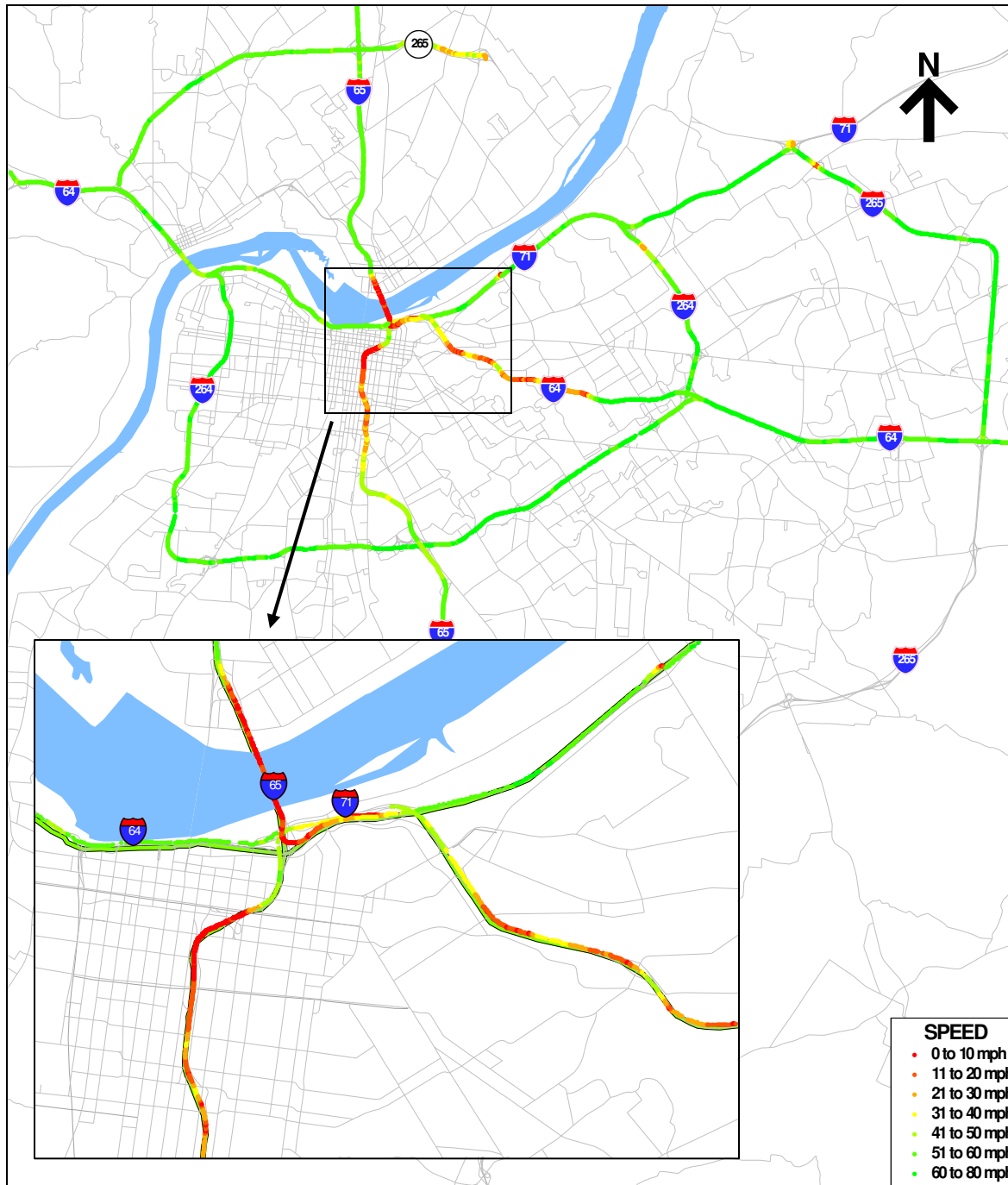


Figure 2.11 Speed Run Results – P.M.



CHAPTER 3

REGIONAL DEMOGRAPHICS AND ECONOMIC CHARACTERISTICS

Growth in the demand for travel is correlated to the underlying economic and demographic trends of a region. Understanding these trends is critical to forecasting traffic and toll facility revenue. This chapter provides a review of the economic and demographic factors in the study area, including existing land uses and population and economic trends.

3.1 REGIONAL GEOGRAPHY AND CORRIDORS

Figure 3.1 presents a map of the Louisville area. The Louisville metro area is advantageously situated between eastern, midwestern and southern population centers. The Interstate Highway System has enabled the Louisville area to develop as a transportation hub for the region and the nation. The geography of Louisville is well utilized by its largest employer, United Parcel Service, which operates an air hub and sorting center in Louisville.

Three major Interstate routes radiate from Louisville in five directions. I-65 to the north links Louisville to Indianapolis and Chicago. To the south, I-65 connects Louisville to Nashville, Birmingham, and the Gulf of Mexico. I-64 to the west links Louisville to Evansville and St. Louis; to the east, the route connects to Lexington, the state's second largest metro area, and on to the east coast of the U.S. To the northwest, I-71 provides an additional radial link from Louisville, connecting to the Cincinnati-Northern Kentucky area and on to Cleveland. Louisville's original transportation corridor, the Ohio River, also serves as the boundary between the state jurisdictions of Indiana and Kentucky. As Louisville has transformed into a freight and logistics hub, the Ohio River remains a natural barrier, both for the Interstate routes in the area and between the cities. The interstate network crosses the river along the I-65 mainline route, near downtown Louisville, and west of downtown along the I-64 route. An older downtown crossing parallels I-65 and carries US 31 across the river. The three crossings have enabled industries to flourish on both sides of the river, along with corresponding population and economic growth.

No toll is currently charged on any of the three Louisville area bridges. The nearest alternate crossings are at significant distances from Louisville. The nearest upstream crossing is between Milton, Kentucky and Madison, Indiana, approximately 50 miles from Louisville. Downstream, the nearest bridge is about 40 miles from Louisville, connecting Brandenburg, Kentucky and Mauckport, Indiana. The Louisville Metropolitan Statistical Area (MSA) includes Jefferson County and eight other Kentucky counties, along with four counties in Indiana. Within the MSA, the KIPDA area covers seven counties in Kentucky including Jefferson, Bullitt and Oldham counties and two counties in Indiana, Clark and Floyd counties.



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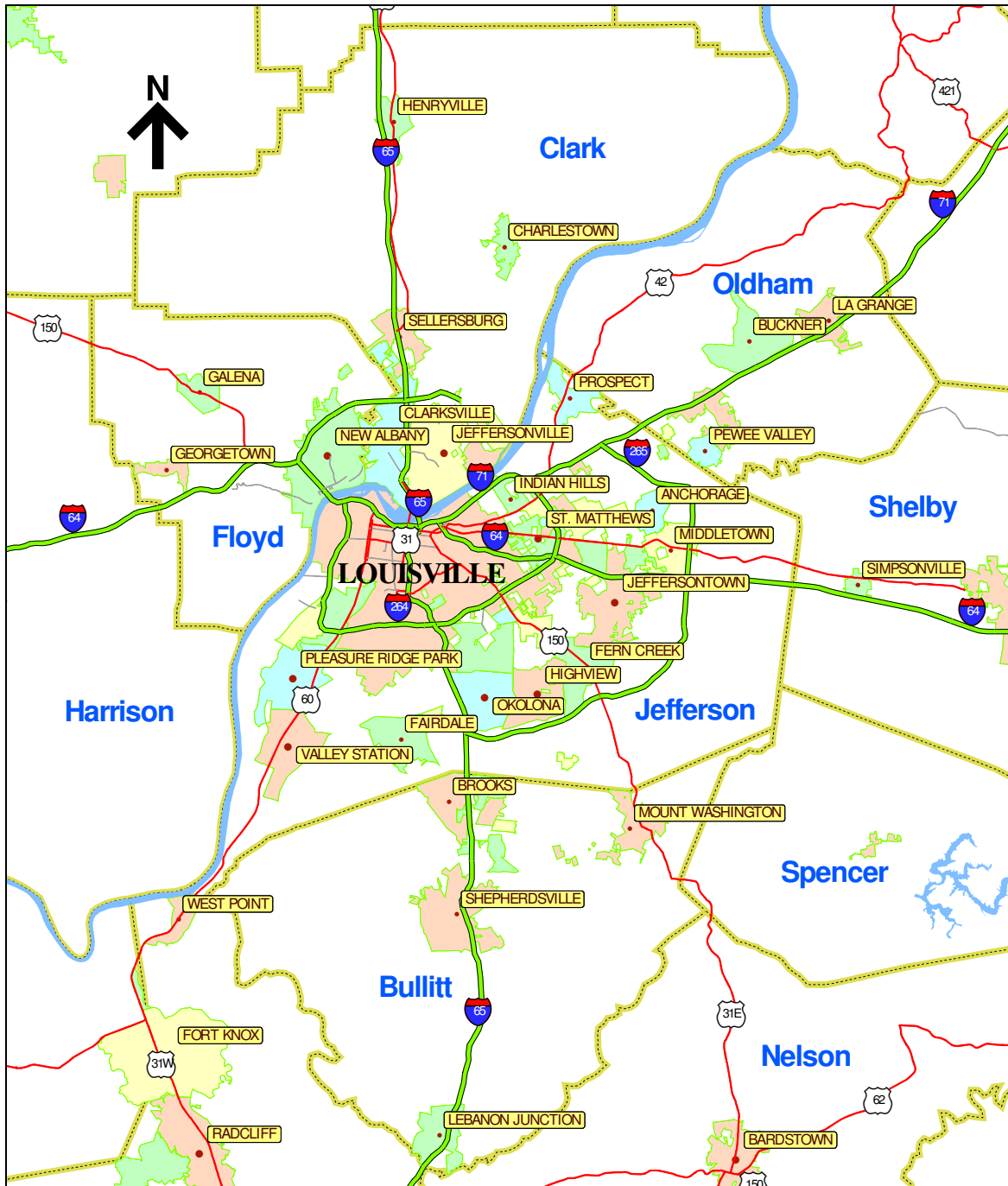


Figure 3.1 Louisville Region



3.2 POPULATION TRENDS

With the 2003 merger of the governments of the City of Louisville and Jefferson County, Louisville became once again the largest city in Kentucky. With a 2006 estimated population of 554,496, the U.S. Census Bureau ranks Louisville as the 16th largest city in the U.S. With a 2006 population of 1.2 million, the Louisville MSA is the 42nd largest in the U.S., up from 43rd just one year previously. The metro population is comparable to the Memphis (ranked 41) and Richmond (ranked 43) metro areas.

Table 3.1 shows US Census Bureau population figures and annualized rates of change for Louisville and other towns and cities within the KIPDA area with a population greater than 5,000 persons. Figures are also shown for the other KIPDA counties and the MSA as a whole, as well as for the two states and the entire U.S.

Table 3.1 Louisville Area Population Trends

Area		1990 Census	2000 Census	Change '90-'00	AAPC	2006	Change '00-'06	AAPC
City of Louisville		269,063	256,231	-12,832	-0.5%	554,496	298,265	*
Largest Surrounding Cities	Douglass Hills	5,549	5,564	15	0.0%	5,737	173	0.5%
	Hillview	6,119	7,068	949	1.5%	7,452	384	0.9%
	Jeffersontown	23,221	26,528	3,307	1.3%	25,907	-621	-0.4%
	La Grange	3,853	5,677	1,824	4.0%	6,180	503	1.4%
	Lyndon	8,037	10,167	2,130	2.4%	10,528	361	0.6%
	Middletown	5,016	5,848	832	1.5%	6,404	556	1.5%
	Mt. Washington	5,226	8,274	3,048	4.7%	11,761	3,487	6.0%
	Shelbyville	6,238	10,094	3,856	4.9%	10,994	900	1.4%
	Shepherdsville	4,805	8,393	3,588	5.7%	9,035	642	1.2%
	Shively	15,535	15,157	-378	-0.2%	15,616	459	0.5%
	St. Matthews	15,800	17,320	1,520	0.9%	17,681	361	0.3%
KIPDA Counties	Bullitt (KY)	47,567	61,236	13,669	2.6%	72,851	11,615	2.9%
	Henry (KY)	12,823	15,060	2,237	1.6%	16,025	965	1.0%
	Jefferson (KY)	664,937	693,604	28,667	0.4%	701,500	7,896	0.2%
	Oldham (KY)	33,263	46,178	12,915	3.3%	55,285	9,107	3.0%
	Shelby (KY)	24,824	33,337	8,513	3.0%	39,717	6,380	3.0%
	Spencer (KY)	6,801	11,766	4,965	5.6%	16,475	4,709	5.8%
	Trimble (KY)	6,090	8,125	2,035	2.9%	9,074	949	1.9%
	Clark (IN)	87,777	96,472	8,695	0.9%	103,569	7,097	1.2%
Other MSA Counties	Floyd (IN)	64,404	70,823	6,419	1.0%	72,570	1,747	0.4%
	Meade (KY)	24,170	26,349	2,179	0.9%	27,994	1,645	1.0%
	Nelson (KY)	29,710	37,477	7,767	2.3%	42,102	4,625	2.0%
	Harrison (IN)	29,890	34,325	4,435	1.4%	36,992	2,667	1.3%
	Washington (IN)	23,717	27,223	3,506	1.4%	28,062	839	0.5%
Louisville MSA		948,829	1,161,975	213,146	2.0%	1,222,216	60,241	0.8%
Kentucky		3,685,296	4,041,769	356,473	0.9%	4,206,074	164,305	0.7%
Indiana		5,544,159	6,080,485	536,326	0.9%	6,313,520	233,035	0.6%
United States		248,709,873	281,421,906	32,712,033	1.2%	299,398,484	17,976,578	1.0%

* The government of the City of Louisville merged with Jefferson County in 2003.

Source: U.S. Census Bureau



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From 1990 to 2000, the city of Louisville experienced an annual decline in population of 0.5%, a change typical of older central cities. The 2003 merger of the governments of Louisville and Jefferson County resulted in the significant population increase shown between 2000 and 2006, and ensured that Louisville would remain the largest city in Kentucky.

Jefferson County, which includes Louisville, grew at an average annual rate of 0.4% between 1990 and 2000, a net change of nearly 29,000 residents, accounting for about one third of metro area growth in that period. However, since 2000, growth in Jefferson County has largely flattened, although the county continues to grow at the modest rate of 0.2%, the slowest growth rate of any of the MSA counties. The whole of Jefferson County experienced a modest population increase, but it remains by far the largest county in the Louisville region.

Since the 2000 census, population in the surrounding cities and counties has increased over the preceding decade, but growth rates tend to have decreased. However, the MSA as a whole still added over 60,000 new residents since 2000, nearly a 10 percent increase. Spencer County showed the highest growth rate of the MSA counties, increasing by nearly 25% since 2000, adding nearly 5000 residents. The greatest volume of population growth was seen in Bullitt County, which added over 11,000 residents since 2000. Washington County, Indiana, added just over 800 residents, the lowest level of population growth of any of the MSA counties.

Table 3.2 shows changes in population distribution by age group for the Louisville MSA from 1990 to 2005. The greatest growth, both in numeric and percentage change, was observed in the baby boomer cohort of 45 to 59 year-olds. However, as baby boomers in the Louisville area aged, the next younger cohort of 25 to 44 year olds also grew, albeit at a relatively slow rate of 7.8%. Overall, the MSA population grew 24.3% at an average annual rate of 1.5%. **Figure 3.2** provides a graphic illustration of these changes.

Table 3.2 Population by Age Group in Louisville MSA

Age Group	Population			Change '90-'05		
	1990	2000	2005*	Number of persons	Percent	AAPC
Younger than 5 years	64,840	69,096	80,506	15,666	24.2%	1.5%
5 to 17 years**	175,499	185,057	207,186	31,687	18.1%	1.1%
18 to 24 years**	91,350	89,934	104,185	12,835	14.1%	0.9%
25 to 44 years	313,956	314,545	338,599	24,643	7.8%	0.5%
45 to 59 years	142,846	197,707	258,094	115,248	80.7%	4.0%
60 to 74 years	114,065	109,937	132,598	18,533	16.2%	1.0%
75 years and older	50,106	59,322	62,748	12,642	25.2%	1.5%
Total	952,662	1,025,598	1,183,916	231,254	24.3%	1.5%

* 2005 age group populations interpolated from American Community Survey percentages.

** 15-19 age group allocated proportionately among these two groups.

Source: U.S. Census Bureau



LOUISVILLE-SOUTHERN INDIANA OHIO RIVER BRIDGES PROJECT PRELIMINARY TRAFFIC AND REVENUE OPTIONS STUDY

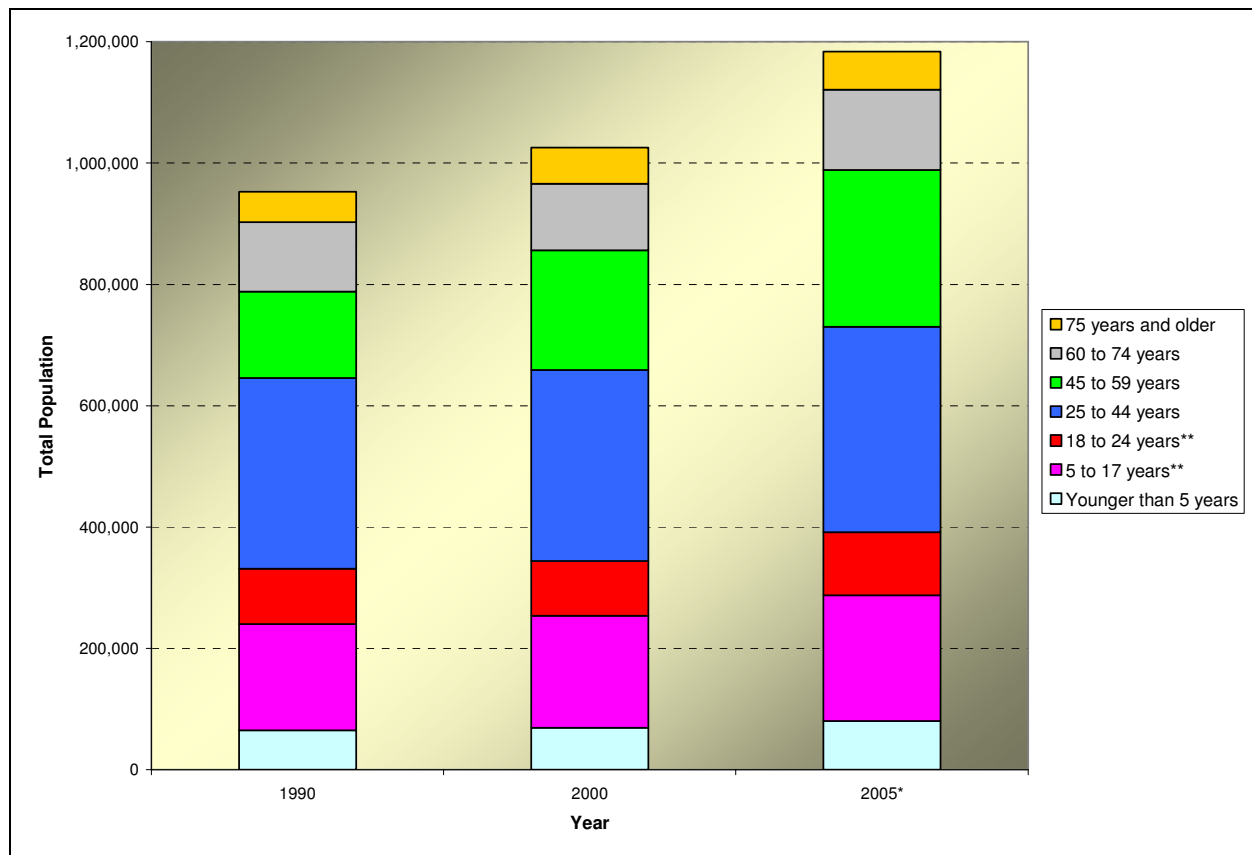


Figure 3.2 Age Distribution in Louisville MSA

Figure 3.3 shows population change in Jefferson, Bullitt, Oldham, Clark and Floyd counties in the KIPDA area between the 1990 and 2000 censuses. As in most U.S. metropolitan areas, growth was most pronounced along the urban periphery, including the eastern portion of Jefferson County along I-265, between I-64 and I-71, and along I-265 in Washington and Floyd counties in Indiana. Significant population growth can also be seen along the Ohio River in Clark County and at the outer portions of Henry and Bullitt counties in Kentucky.

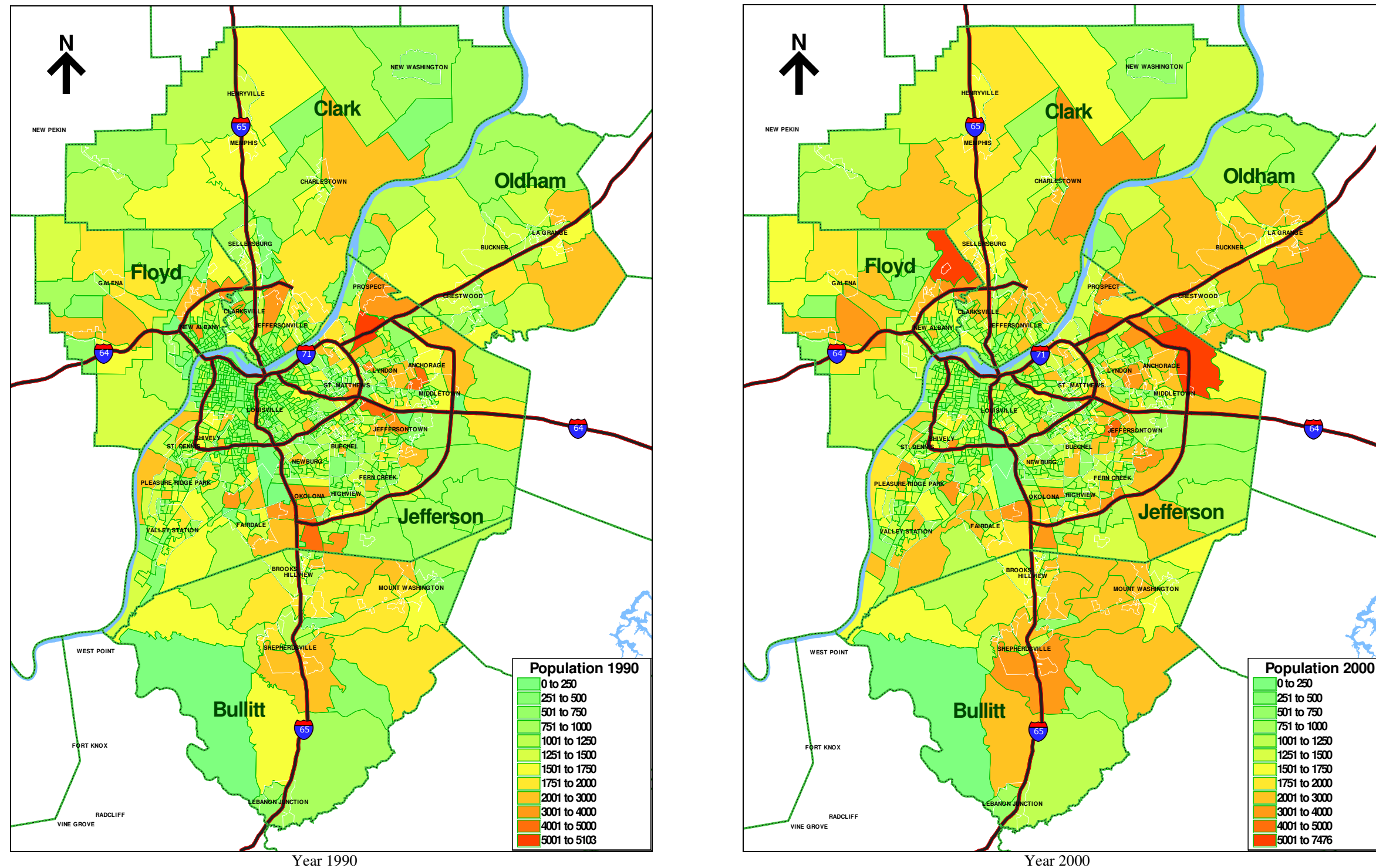


Figure 3.3 Population Changes (1990 to 2000) in the KIPDA Area



LOUISVILLE-SOUTHERN INDIANA OHIO RIVER BRIDGES PROJECT PRELIMINARY TRAFFIC AND REVENUE OPTIONS STUDY

To provide a regional perspective for growth rates in the KIPDA area, the populations of neighboring states are shown for years 2000 and 2006 in **Table 3.3**. Annual growth rates ranged from 0.1% to 1.3% in adjacent states. Kentucky and Indiana have experienced growth rates near the regional average of 0.6% annually.

Table 3.3 Population Growth in Surrounding States

State	2000	2006	AAPC
Indiana	6,080,485	6,313,520	0.6%
Kentucky	4,041,769	4,206,074	0.7%
Illinois	12,419,293	12,831,970	0.5%
Missouri	5,595,211	5,842,713	0.7%
Ohio	11,353,140	11,478,006	0.2%
Tennessee	5,689,283	6,038,803	1.0%
Virginia	7,078,515	7,642,884	1.3%
West Virginia	1,808,344	1,818,470	0.1%
Total	54,066,040	56,172,440	0.6%

Source: U.S. Census Bureau

3.3 HOUSEHOLD TRENDS

Table 3.4 shows changes in the number and average size of households in the city of Louisville and the Louisville MSA, as well as the states of Indiana, Kentucky, and the United States as a whole. From 1990 to 2000, the number of households decreased within the city, but increased in each of the other geographical divisions. However, during that same time period, household size decreased in each of the presented areas.

Table 3.4 Household Characteristics

Area	Number of Households			Average Household Size		
	1990	2000	AAPC	1990	2000	AAPC
City of Louisville	113,065	111,414	-0.15%	2.30	2.22	-0.35%
Louisville MSA	367,819	412,050	1.14%	2.54	2.44	-0.40%
Indiana	2,065,355	2,336,306	1.24%	2.60	2.53	-0.27%
Kentucky	1,379,782	1,590,647	1.43%	2.59	2.47	-0.47%
United States	91,947,410	105,480,101	1.38%	2.62	2.59	-0.12%

Source: U.S. Census Bureau



LOUISVILLE-SOUTHERN INDIANA OHIO RIVER BRIDGES PROJECT PRELIMINARY TRAFFIC AND REVENUE OPTIONS STUDY

Table 3.5 presents a more detailed look at households by age group for each of the five areas in both 1990 and 2000. Despite the decreasing number of households within the City of Louisville, the number of householders within the age groups of 15-24 years olds, 35-44 year olds, and 45-54 year olds increased. At each geographical level presented, the number of senior householders (age 65 years and older) decreased from the 1990 data set to the 2000 data set. However, the portion of senior householders for the city of Louisville remains above both state and national levels. With the exception of the 1990 city data, the largest number of householders falls within the 35-44 age range.

Table 3.5 Households by Age Group

Area		Householder Age Range							% Senior ¹ HH's
		15-24	25-34	35-44	45-54	55-64	65-74	75+	
City of Louisville	1990	6,690	23,684	21,947	14,175	15,882	16,845	13,842	27.1%
	2000	8,158	20,255	23,250	20,808	12,888	12,831	13,224	23.4%
	AAPC	2.0%	-1.6%	0.6%	3.9%	-2.1%	-2.7%	-0.5%	-1.5%
Louisville MSA	1990	17,803	77,838	83,526	57,417	52,246	46,522	32,467	21.5%
	2000	22,093	71,479	93,081	85,176	55,239	45,730	39,252	20.6%
	AAPC	2.2%	-0.8%	1.1%	4.0%	0.6%	-0.2%	1.9%	-0.4%
Indiana	1990	118,383	440,659	448,437	322,486	283,057	260,106	192,227	21.9%
	2000	142,253	407,965	520,639	465,450	314,708	252,079	233,212	20.8%
	AAPC	1.9%	-0.8%	1.5%	3.7%	1.1%	-0.3%	2.0%	-0.5%
Kentucky	1990	78,032	287,386	296,094	214,286	192,489	177,998	133,497	22.6%
	2000	94,076	275,396	344,989	316,284	224,015	180,169	155,718	21.1%
	AAPC	1.9%	-0.4%	1.5%	4.0%	1.5%	0.1%	1.6%	-0.7%
United States	1990	5,049,358	19,849,651	20,393,073	14,303,214	12,379,413	11,516,582	8,456,119	21.7%
	2000	5,533,613	18,297,815	23,968,233	21,292,629	14,247,057	11,507,562	10,633,192	21.0%
	AAPC	0.9%	-0.8%	1.6%	4.1%	1.4%	0.0%	2.3%	-0.3%

¹ % Senior Households: Senior Households classified as householders age 65 or greater

Source: U.S. Census Bureau

3.4 PERSONAL AND HOUSEHOLD INCOME

Personal and household income in the Louisville area has grown along with the population. **Table 3.6** shows median household income by area. Median household income in the Louisville MSA, as measured in 2006 dollars, grew at a rate of 1 percent annually between 1989 and 1999, nearly double the rate of income growth in the US as a whole. As of 1999, Oldham County had the highest median household income among the KIPDA counties, and Douglass Hills was the city with the highest income. Median household income was lowest in Trimble County and in the City of Louisville.



LOUISVILLE-SOUTHERN INDIANA OHIO RIVER BRIDGES PROJECT PRELIMINARY TRAFFIC AND REVENUE OPTIONS STUDY

Over the decade, when accounting for inflation, household income grew in all of the KIPDA counties, although not in all of the surrounding cities. Spencer County and the city of La Grange showed the highest income growth rates, while the cities of Douglass Hills and Shively showed the lowest growth rates. The most significant change is the change in income in the Louisville MSA relative to the U.S. as a whole. In 1989, median household income in the Louisville MSA was approximately \$2,400 lower than in the U.S. as a whole. By 1999, that gap had been reduced to approximately \$1,100.

Table 3.6 Median Household Income

Area		Nominal Dollars			2006 Dollars		
		1989	1999	AAPC	1989	1999	AAPC
City of Louisville		\$20,141	\$28,843	3.7%	\$32,169	\$34,296	0.6%
KIPDA Counties	Bullitt (KY)	\$29,455	\$45,106	4.4%	\$47,045	\$53,634	1.3%
	Henry (KY)	\$22,528	\$37,263	5.2%	\$35,981	\$44,308	2.1%
	Jefferson (KY)	\$27,092	\$39,457	3.8%	\$43,271	\$46,917	0.8%
	Oldham (KY)	\$38,416	\$63,229	5.1%	\$61,357	\$75,183	2.1%
	Shelby (KY)	\$28,500	\$45,534	4.8%	\$45,520	\$54,143	1.7%
	Spencer (KY)	\$22,680	\$47,042	7.6%	\$36,224	\$55,936	4.4%
	Trimble (KY)	\$22,372	\$36,192	4.9%	\$35,732	\$43,034	1.9%
	Clark (IN)	\$27,386	\$40,111	3.9%	\$43,740	\$47,694	0.9%
	Floyd (IN)	\$28,460	\$44,022	4.5%	\$45,456	\$52,345	1.4%
Largest Surrounding Cities (KY)	Douglass Hills	\$48,203	\$60,021	2.2%	\$76,989	\$71,369	-0.8%
	Hillview	\$31,686	\$42,743	3.0%	\$50,608	\$50,824	0.0%
	Jeffersontown	\$38,962	\$51,999	2.9%	\$62,229	\$61,830	-0.1%
	La Grange	\$19,785	\$37,778	6.7%	\$31,600	\$44,920	3.6%
	Lyndon	\$30,845	\$42,974	3.4%	\$49,265	\$51,099	0.4%
	Middletown	\$36,976	\$53,608	3.8%	\$59,057	\$63,743	0.8%
	Mount Washington	\$26,797	\$43,813	5.0%	\$42,800	\$52,096	2.0%
	Shelbyville	\$17,414	\$37,607	8.0%	\$27,813	\$44,717	4.9%
	Shepherdsville	\$21,592	\$36,103	5.3%	\$34,486	\$42,929	2.2%
	Shively	\$24,966	\$31,422	2.3%	\$39,875	\$37,363	-0.6%
	St. Matthews	\$32,108	\$42,219	2.8%	\$51,282	\$50,201	-0.2%
Louisville MSA		\$27,599	\$40,821	4.0%	\$44,081	\$48,539	1.0%
Kentucky		\$22,534	\$33,672	4.1%	\$35,991	\$40,038	1.1%
Indiana		\$28,797	\$41,567	3.7%	\$45,743	\$49,308	0.8%
United States		\$30,056	\$41,994	3.4%	\$48,865	\$50,816	0.4%

* 2006 dollars for US calculated using BLS consumer price indices for all urban areas.

* South regional CPI-U used to inflate city and county values.

* North central regional and south regional CPI-U used to inflate Kentucky and Indiana values.

Sources: U.S. Census Bureau, U.S. Bureau of Labor Statistics



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Table 3.7 shows changes in per capita income from 1994 to 2005, in the Louisville MSA and in the states of Indiana and Kentucky and in the US as a whole. The MSA has consistently shown higher per capita income than either of the two states. Compared to the U.S., income in Louisville has hovered just under the national average for most of the last decade, although, in 2002, it came within 0.1% of matching the national average.

Table 3.7 Per Capita Income Changes

Year	Louisville MSA			Kentucky		
	Nominal Dollars	2005 Dollars	% of U.S. Average	Nominal Dollars	2005 Dollars	% of U.S. Average
1994	21,824	28,553	97.7	18,225	23,844	81.6
1995	22,760	28,895	97.7	18,879	23,968	81.0
1996	23,826	29,339	97.5	19,854	24,448	81.2
1997	24,810	29,829	96.8	20,855	25,074	81.3
1998	26,719	31,600	98.1	22,043	26,070	80.9
1999	27,584	31,941	97.5	22,763	26,359	80.5
2000	29,394	32,905	97.2	24,411	27,326	80.7
2001	30,333	33,071	98.1	24,915	27,164	80.6
2002	31,009	33,402	99.9	25,401	27,362	81.8
2003	31,374	33,151	99.2	25,840	27,304	81.7
2004	32,522	33,555	98.2	27,020	27,878	81.6
2005	33,749	33,749	97.9	28,272	28,272	82.0
Year	Indiana			U.S.		
	Nominal Dollars	2005 Dollars	% of U.S. Average	Nominal Dollars	2005 Dollars	
1994	20,761	26,865	91.9	22,172	29,219	
1995	21,408	26,878	90.9	23,076	29,572	
1996	22,368	27,185	90.3	24,175	30,092	
1997	23,306	27,636	89.6	25,334	30,827	
1998	24,894	29,201	90.7	26,883	32,210	
1999	25,615	29,499	90.1	27,939	32,752	
2000	27,130	30,313	89.6	29,845	33,849	
2001	27,403	30,003	89.0	30,574	33,716	
2002	28,023	30,350	90.7	30,810	33,447	
2003	28,857	30,618	91.6	31,484	33,418	
2004	30,134	31,119	91.1	33,050	34,170	
2005	31,173	31,173	90.4	34,471	34,471	

* 2006 dollars for US calculated using BLS consumer price indices for all urban areas.

* South regional CPI-U used to calculate 2005 MSA dollars.

* North central regional and south regional CPI-U used to calculate Kentucky and Indiana 2005 dollars.

Sources: Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce



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Table 3.8 shows the numbers and percentages of people living at or below the federally-defined poverty level in the City of Louisville, the Louisville MSA, the states of Kentucky and Indiana, and the entire United States for 1990 and 2000. Poverty levels are defined according to household sizes and local costs of living. The City of Louisville lost over 12,000 residents in that decade, approximately 5% of its population, but in that same decade, its poverty-level population declined over 5,000, or nearly 10%, with the total proportion of residents below the poverty level declining from 22.6% to 21.6%.

The decline in poverty-level populations in the MSA was even greater, both in absolute numbers and percentages. In 1990, nearly 13% of MSA residents lived at or below the poverty level; by 2000, just under 11% did. These changes were mirrored statewide in Kentucky and Indiana, and though Kentucky's poverty-level population declined more dramatically, both in absolute numbers and percentage, its poverty level percentage was nearly 16% in 2000, well ahead of Indiana and the U.S. as a whole.

Table 3.8 Poverty Level

Area		Total Population	Pop. Below Poverty Level	% Below Poverty Level
City of Louisville	1990	261,622	59,144	22.6%
	2000	249,136	53,799	21.6%
	change	-12,486	-5,345	-1.0%
Louisville MSA	1990	935,289	118,664	12.7%
	2000	1,004,858	109,575	10.9%
	change	69,569	-9,089	-1.8%
Indiana	1990	5,372,388	573,632	10.7%
	2000	5,894,295	559,484	9.5%
	change	521,907	-14,148	-1.2%
Kentucky	1990	3,582,459	681,827	19.0%
	2000	3,927,047	621,096	15.8%
	change	344,588	-60,731	-3.2%
United States	1990	241,977,859	31,742,864	13.1%
	2000	273,882,232	33,899,812	12.4%
	change	31,904,373	2,156,948	-0.7%

Source: U.S. Census Bureau



3.5 EMPLOYMENT TRENDS

Table 3.9 shows all employers in the Louisville MSA with 1,000 or more full time employees. Among the top employers are many nationally known companies. United Parcel Service is headquartered in Louisville and maintains an air hub and sorting center in the area, making it the largest employer in the area by far, with over 18,000 employees. Other well-known employers with their headquarters in the Louisville area include Humana, Brown Forman, and Yum Brands, the owner of KFC, A&W, Pizza Hut and other food service companies.

Other sectors with significant local employment include manufacturing, health care and financial services. Large manufacturers in the area include the Ford Motor Company's truck assembly plant and GE's appliance factory. Large public sector employers include the expected array of federal, state and local offices and school districts, as well as the U.S. Census Bureau's data processing center in Jeffersonville, Indiana and the Veterans Administration medical center in Louisville.

Table 3.10 presents trends in labor force and total employment over the past 11 years. Although the work force based in the city of Louisville has grown by over 13 percent in that time, the city's share of regional employment has declined, and the total employment in the city has declined by nearly 6,000 workers, while employment in the MSA has increased by nearly 25,000. Total employment in the MSA peaked at nearly 600,000 in 1999, but declined between 2000 and 2002.

Table 3.11 shows median hourly wages and total employment by occupational groups in the Louisville MSA. The largest wage groups are office and administrative support and sales and related occupations. Combined, these total nearly 30% of the Louisville area employment. Both groups show a median hourly wage below the regional median wage of \$13.92. However, the Louisville area also shows significant populations of higher paying wage groups, such as management, education, and health care.



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Table 3.9 Major Employers in the Louisville Area

Employer	Sector	Employees ¹
UPS	Shipping & logistics	18,398
Jefferson County Public Schools	Public education	13,281
Ford Motor Co	Automotive manufacturing	8,745
Norton Healthcare	Health care	7,783
Humana Inc	Health care	7,458
Louisville-Jefferson Co. Metro Government	Local government	5,993
Jewish Hospital Healthcare	Health care	5,907
University of Louisville	Postsecondary education	5,563
Kroger Co.	Retail grocer	5,177
GE Consumer & Industrial	Household appliance manufacturing	5,000
Commonwealth of Kentucky	State government	4,700
Baptist Hospital East	Health care	3,140
US Government	Federal Government	2,826
US Postal Service	Mail and shipping	2,674
Catholic Archdiocese of Louisville	Religious organization	2,437
Kindred Healthcare, Inc.	Health care	2,394
University of Louisville Hospital	Health care	2,346
Yum Restaurant Services	Restaurants	2,123
Caesars Indiana	Casino/resort	1,942
US Census National Processing Center	Federal Government	1,810
Publishers Printing	Printing	1,702
Greater Clark County Schools	Public education	1,598
Anthem Blue Cross / Blue Shield	Health insurer	1,575
J P Morgan Chase Bank	Financial services	1,500
BellSouth	Telecommunications	1,476
Bullitt County Public Schools	Public education	1,473
Lowe's Companies, Inc.	Retail lumber / hardware	1,450
Oldham County Public Schools	Public education	1,407
Floyd Memorial Hospital	Health care	1,337
SHPS	Health services	1,315
Citigroup	Financial services	1,312
National City Bank of Kentucky	Financial services	1,267
Brown-Forman Co.	Beverages	1,264
Swift & Co	Food processing	1,250
VA Medical Center	Health care	1,234
New Albany-Floyd Co. Consolidated Schools	Public education	1,215
Seven Counties Services Inc.	Health care	1,137
Al J. Schneider Co.	Commercial real estate	1,100
Clark Memorial Hospital	Health care	1,098
Courier-Journal	Newspaper publishing	1,025
Jeffboat LLC	Marine manufacturing	1,009

¹ Total employees in Louisville metro area.

Source: 2006 survey of local employers published by *Business First*



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Table 3.10 Labor Force and Employment (in thousands)

Year	City of Louisville		Louisville MSA		Indiana		Kentucky		U.S.	
	Labor Force	Total Employment	Labor Force	Total Employment	Labor Force	Total Employment	Labor Force	Total Employment	Labor Force	Total Employment
1996	317	346	593	568	3,103	2,983	1,880	1,777	133,951	126,720
1997	369	353	605	581	3,118	3,014	1,913	1,810	136,301	129,573
1998	370	357	610	590	3,125	3,033	1,920	1,833	137,680	131,476
1999	375	361	622	600	3,137	3,047	1,944	1,854	139,380	133,501
2000	361	348	610	588	3,144	3,053	1,949	1,866	142,586	136,901
2001	355	338	603	575	3,152	3,021	1,954	1,852	143,769	136,939
2002	350	330	598	566	3,166	3,003	1,950	1,838	144,856	136,481
2003	350	329	602	567	3,180	3,011	1,975	1,851	146,501	137,730
2004	348	329	602	570	3,186	3,017	1,969	1,860	147,384	139,242
2005	352	330	612	577	3,227	3,055	1,999	1,879	149,296	141,715
2006	360	340	628	593	3,271	3,109	2,039	1,922	151,413	144,420
change 96-06	13.7%	-1.7%	5.8%	4.5%	5.4%	4.2%	8.4%	8.2%	13.0%	14.0%

Source: Bureau of Labor Statistics

Table 3.11 Wages by Occupation in Louisville MSA (2006)

Occupation	Employment	Percent	Median Hourly Wage
Management	26,680	4.5%	\$ 34.82
Business and financial operations	21,100	3.5%	22.40
Computer and mathematical	10,580	1.8%	26.74
Architecture and engineering	7,080	1.2%	24.63
Life, physical, and social science	3,150	0.5%	21.24
Community and social services	6,040	1.0%	16.75
Legal	3,720	0.6%	24.19
Education, training, and library	29,090	4.9%	17.78
Arts, design, entertainment, sports, and media	6,290	1.1%	15.27
Health care practitioners and technical	34,280	5.7%	23.37
Healthcare support	16,470	2.8%	11.58
Protective service	12,160	2.0%	13.98
Food preparation and serving related	49,380	8.3%	7.44
Building and grounds cleaning and maintenance	18,420	3.1%	9.61
Personal care and service	11,940	2.0%	8.46
Sales and related	62,900	10.5%	11.19
Office and administrative support	105,540	17.7%	12.98
Farming, fishing, and forestry	730	0.1%	10.21
Construction and extraction	28,350	4.7%	16.34
Installation, maintenance, and repair	24,560	4.1%	16.90
Production	59,230	9.9%	14.66
Transportation and material moving	59,400	9.9%	12.40
Total	597,090		\$13.92

Source: Bureau of Labor Statistics, May 2006 estimates



3.6 JOURNEY TO WORK CHARACTERISTICS

Table 3.12 shows the average commuting times for the Louisville MSA and the U.S. as a whole. As in the greater U.S., the fastest growing segment of commuters are those with commutes of 60 minutes or more, although well over three-quarters of Louisville area commuters had a commute time of less than 25 minutes in 2005. As commute times tend to increase in proportion to MSA size, this is likely due to the relatively small size of the Louisville MSA and the coverage of the existing highway network.

Table 3.12 Average Commuting Time

Travel Time	Louisville MSA			United States		
	1990	2005	2005 Share	1990	2005	2005 Share
Work at Home	8,703	13,733	2.5%	3,406,025	4,796,178	3.6%
Commute	429,623	542,900	97.5%	89,559,935	128,294,865	96.4%
Less than 10 minutes	52,400	65,691	11.8%	4,314,682	18,846,516	14.2%
10 - 14 min	65,107	74,377	13.4%	17,954,128	18,346,166	13.8%
15 - 19 min	85,122	95,550	17.2%	19,026,053	19,860,045	14.9%
20 - 24 min	83,969	104,780	18.8%	16,243,343	18,577,096	14.0%
25 - 29 min	36,969	46,147	8.3%	6,193,587	7,813,157	5.9%
30 - 34 min	63,463	74,920	13.5%	14,237,947	16,922,093	12.7%
35 - 44 min	20,324	34,746	6.2%	2,634,749	8,198,042	6.2%
45 - 59 min	16,870	27,688	5.0%	7,191,455	9,609,285	7.2%
60 or more min	5,399	19,001	3.4%	1,763,991	10,122,465	7.6%

Source: U.S. Census Bureau

Table 3.13 shows the reported commute departure times from the 1990 and 2000 censuses and the 2005 American Community Survey for the Louisville MSA and the U.S. as a whole. Nationwide, the greatest growth rate is found in those with non-traditional commutes, leaving home after 9 a.m. While the growth in this segment is much lower in the Louisville area, the Louisville MSA does show rapid growth in the overnight segment of 12 to 5 a.m., and the 5 to 6 a.m. segments. The overnight segment likely has to do with the growth of Louisville's largest employer, United Parcel Service, and the large numbers of employees who work overnight shifts at the UPS sorting and hub facilities. Growth in the early morning hour of 5 to 6 a.m. reflects national trends of longer commutes, longer work hours, and earlier and longer peak traffic times.



Table 3.13 Commuting Departure Times

Time Leaving Home	Louisville MSA				U.S.			
	1990*	2000*	2005*	AAPC '90-'05	1990*	2000*	2005*	AAPC '90-'05
12:00 AM - 4:59 AM	11	15	22	3.4%	2,747	4,238	5,003	4.4%
5:00 AM - 5:29 AM	11	14	19	2.6%	2,724	3,763	4,490	3.3%
5:30 AM - 5:59 AM	16	19	22	1.7%	4,422	5,677	6,415	2.5%
6:00 AM - 6:29 AM	35	37	41	0.5%	9,807	10,810	11,547	1.0%
6:30 AM - 6:59 AM	46	46	60	0.1%	13,014	13,386	13,728	0.3%
7:00 AM - 7:29 AM	69	71	74	0.3%	17,745	18,640	18,988	0.5%
7:30 AM - 7:59 AM	68	77	77	1.2%	17,601	19,666	17,448	1.1%
8:00 AM - 8:29 AM	49	52	60	0.6%	12,834	13,410	13,856	0.4%
8:30 AM - 8:59 AM	25	28	31	0.9%	6,034	6,528	7,056	0.8%
9:00 AM - 11:59 PM	107	122	137	1.3%	24,965	52,835	29,764	7.8%

* workers in thousands
Source: U.S. Census Bureau

3.7 FREIGHT TRAFFIC

The Louisville area has grown as a logistics and distribution center, due in large part to the area's strategic location between midwestern, eastern and southern population centers. With the nearest alternate Interstate-grade Ohio River crossings located more than 100 miles in either direction, much of the regional freight traffic is channeled through the existing I-64 and I-65 bridges.

Figure 3.4 shows the modeled 2002 and 2035 daily commodity flows in the region including Indiana, Ohio and Kentucky from the U.S. Department of Transportation's Freight Analysis Framework (FAF). The figure indicates major north-south freight movement passing through Columbus and Cincinnati, OH, and Louisville. Freight flows that pass through Indianapolis and Louisville are also significant.

Considerable growth of commodity flows is anticipated from 2002 to 2035. Trucks on I-65 are projected to grow at an annual compound growth rate of 3.1% between 2002 and 2035. Growth of trucks on I-71 between Louisville and Cincinnati is forecasted at an annual growth rate of 2.8%.

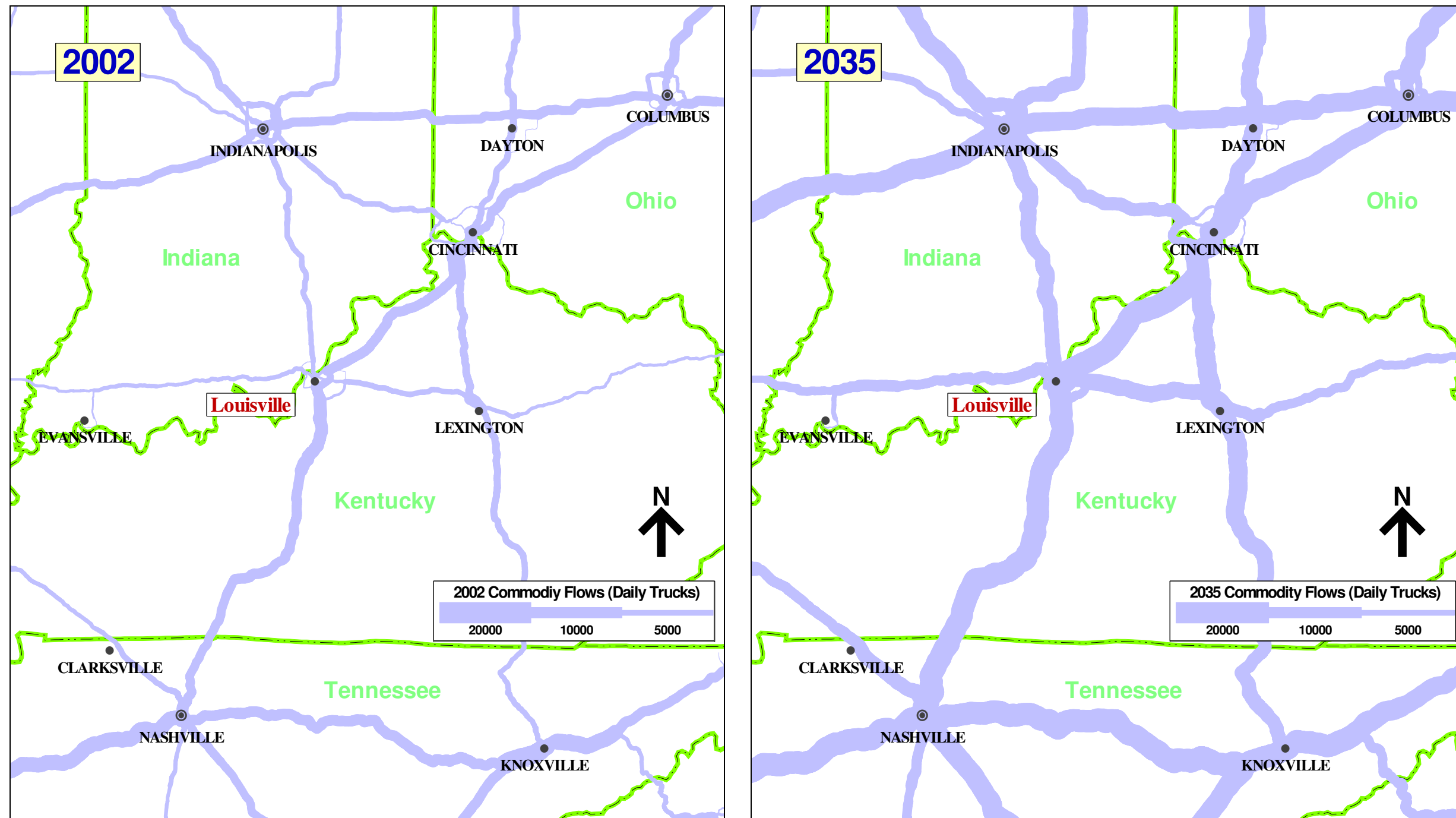


Figure 3.4 Freight Analysis Framework (FAF) Freight Flows (2002 and 2035)



3.8 AIR TRAFFIC

Table 3.14 presents a summary of passenger and freight traffic for Louisville International Airport for 2005 and 2006. **Figure 3.5** depicts changes in passenger traffic at the airport since 1990. Between 2005 and 2006, passenger traffic declined slightly, but freight traffic grew nearly ten percent. The longer term trend for passenger traffic at the airport corresponds to growth in the metropolitan area, with traffic having nearly doubled since 1990.

Table 3.14 Louisville Airport Traffic

Month	Arriving Passengers			Departing Passengers			Mail/Express/Freight (tons)		
	2005	2006	Change	2005	2006	Change	2005	2006	Change
January	124,519	130,930	5.1%	125,528	131,411	4.7%	148,182	160,954	8.6%
February	125,720	132,697	5.5%	124,352	131,452	5.7%	146,760	154,326	5.2%
March	151,156	165,056	9.2%	151,430	160,669	6.1%	152,370	186,071	22.1%
April	150,664	149,020	-1.1%	154,670	157,422	1.8%	161,508	165,532	2.5%
May	174,510	171,243	-1.9%	168,133	167,165	-0.6%	154,014	172,157	11.8%
June	175,119	169,712	-3.1%	174,115	167,174	-4.0%	173,221	188,507	8.8%
July	179,187	162,537	-9.3%	180,003	165,682	-8.0%	161,532	173,894	7.7%
August	155,599	151,433	-2.7%	161,271	153,579	-4.8%	173,350	205,868	18.8%
September	158,920	145,436	-8.5%	155,179	142,466	-8.2%	178,992	196,216	9.6%
October	172,119	163,407	-5.1%	173,548	163,690	-5.7%	176,965	196,012	10.8%
November	153,333	151,917	-0.9%	155,126	151,569	-2.3%	180,220	196,101	8.8%
December	144,684	142,386	-1.6%	136,766	133,988	-2.0%	193,716	190,644	-1.6%
Annual	1,865,530	1,835,774	-1.6%	1,860,121	1,826,267	-1.8%	2,000,830	2,186,282	9.3%

Source: Louisville Regional Airport Authority

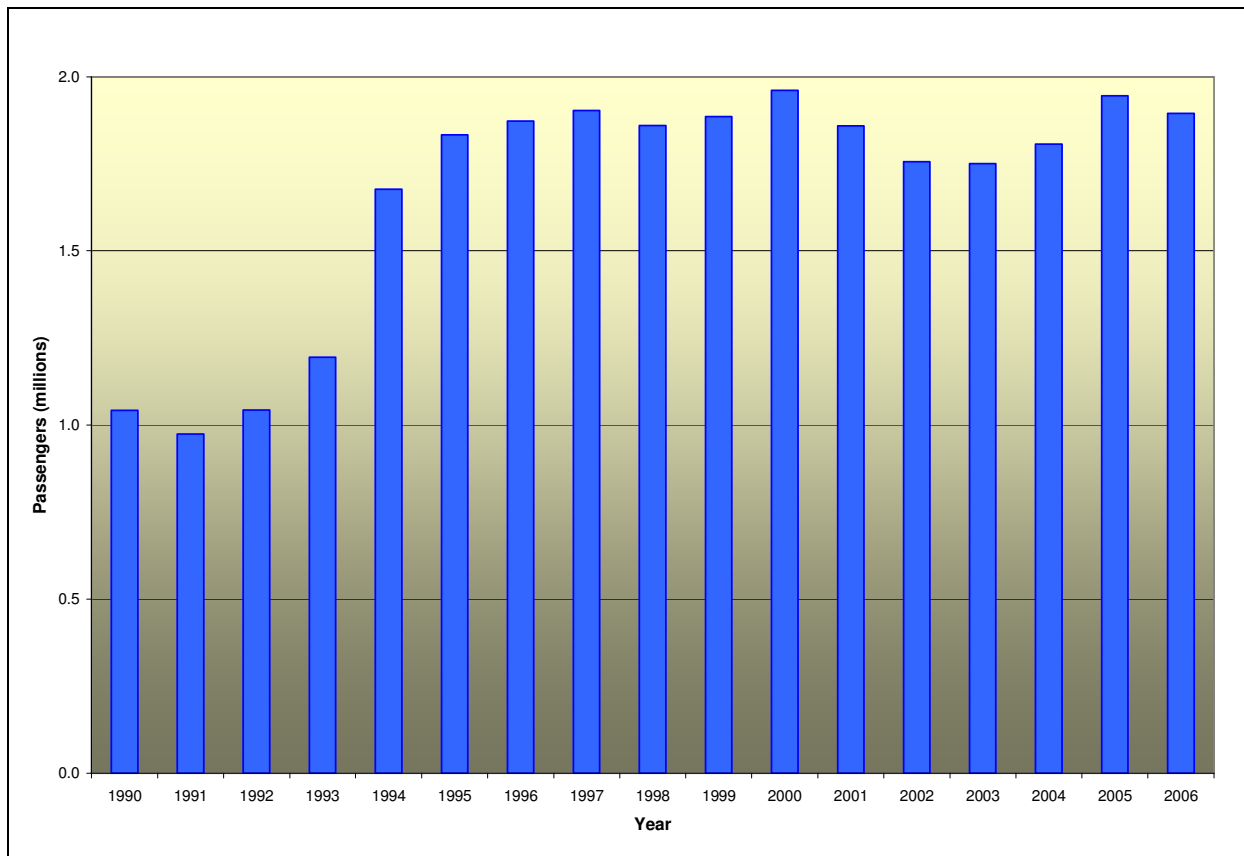


Figure 3.5 Passengers Departing Louisville Airport
(Source: Bureau of Transportation Statistics)

3.9 SUMMARY

The Louisville MSA has shown significant growth in population and employment over the past several decades. The regional economic base includes a diverse mix of manufacturing and service industries that have leveraged Louisville's traditional geographic advantages and helped the area attract new residential growth.

The region's economic growth has helped drive growth in household incomes. The median household income for the Louisville MSA approaches that of the U.S. as a whole, and the number of people in the MSA living below the poverty line has declined, even as the MSA population has grown. As in most U.S. cities, population and job growth are highest in the urban periphery, suggesting continued growth in demand for automobile travel. Travel demand in the Louisville area is further strengthened by the area's role as a logistics and long-distance freight hub.



CHAPTER 4

PROPOSED TOLL COLLECTION SYSTEM AND TOLL SCENARIOS

This chapter presents the proposed toll collection system and toll scenarios for the Ohio River bridges and the Kennedy Interchange.

4.1 OVERVIEW OF TOLL COLLECTION SYSTEM

Tolling systems throughout the U.S., and worldwide as well, have been implemented under a variety of scenarios and configurations. Until the early 1990's, the vast majority of toll collections systems were comprised of cash collection by way of paying a toll collector and/or depositing coins or tokens in an Automatic Coin Machine (ACM). Since then, the toll industry has seen a significant shift towards the use of Electronic Toll Collection (ETC), allowing users to pay tolls without the need to stop for a toll transaction. This collection method commonly involves deployment of an automated Violation Enforcement System (VES) to capture the license plate number and jurisdiction of vehicles not recording a valid ETC transaction in a toll lane.

Implementation of ETC at new and reconstructed toll plazas has often been combination of both ETC express lanes and a conventional plaza, providing toll booths for cash payment and possibly dedicated ETC lanes to supplement the express lanes. The express lanes and conventional plaza are physically separated and resemble a condensed bypass configuration with the express lanes following the mainline alignment. More recently, the trend is shifting to what is commonly referred to as Open Road Tolling (ORT). ORT tolling is equivalent to an all-electronic implementation where the number of non-stop ETC lanes through the tolling zones exactly equals the number of mainline lanes. This configuration may be supplemented by a small conventional plaza for cash located to the outside of the tolling zones in each direction of travel. In an ORT system, the tolling zone is essentially an overhead gantry system comprised of ETC and VES equipment. If there are provisions for cash payment, the tolling is often higher than the toll paid by customers who register with the ETC program.

4.2 PROPOSED TOLL COLLECTION SYSTEM

For this project, the following two tolling alternatives are possible solutions meriting consideration:

- An all-electronic, ORT implementation offering non-stop ETC with no option for cash payment and complimented with an automated VES. All tolls are paid from accounts established as a condition of legally using the facility; or
- An automated video tolling implementation providing non-stop front and rear license plate image capture of all vehicles with no provisions cash collection or ETC. Toll is paid either from program



accounts established prior to usage or from invoices sent to non-program users listing toll charges incurred after use of the facility over a particular time period.

4.2.1 OPEN ROAD TOLLING (ORT) ALTERNATIVE

Under this toll collection scheme, users are encouraged to join an ETC program or obtain temporary authorization as a condition of using the facility because no cash option exists. There are several variations in how an ORT system can be deployed. In some cases, ORT programs require the user to have an ETC transponder installed in their vehicle and subsequently those without transponders are considered violators. In other scenarios, the non-program users request permission to use the facility by telephone, kiosk or Web site and pay the required toll, typically by credit card. Although the transaction may be processed as a violation, a filter is applied that extracts transaction records with license plate data that matches the plate number entered by a prepaid, non-ETC equipped user. The toll charged for this type of user should be set higher than the toll for users enrolled in the ETC program to encourage all users to obtain a transponder.

The accuracy of ETC equipment is quoted by vendors to be 99.99%. However, this assumes proper transponder installation for all vehicles, which is unrealistic. The violation enforcement system is expected to capture the license plate number and jurisdiction of violators as well as customers enrolled in the ETC Program whose transponder is not read in the toll lane.

The ORT alternative does not provide for the option of cash payment. The tolling zone is comprised of overhead gantry, sign structures or cantilever structures for mounting the necessary tolling equipment such as antennas, cameras, and supplemental lighting, etc. **Figure 4.1** represents the typical layout of an ORT zone.

The advantages of the ORT system can be summarized as follows:

- Minimizes right-of-way requirements,
- Low capital costs to deploy,
- Maximizes the lowest processing cost transaction type (ETC) and minimizes the number of accounts subject to the violation enforcement regimen,
- Immediate identification of violators allowing quick adoption of mitigation strategies, and
- Less license plate review and character extractions cost relative to video tolling.

The disadvantages of ORT lanes are the following:

- Expected to result in reduced transactions by infrequent users and visitors unable or unwilling to obtain a transponder, with mitigation possible through support of video tolling and or temporary transponders or tags that are assessed additional service fees,
- Additional transaction type(s) as noted above adds operational complexity,
- Higher violations and associated processing costs attributable to users wanting to avoid the inconvenience of making prior arrangements to pay the toll,
- Perception of disproportionately impacting low income users who can not afford the deposit needed to open an account as a condition of obtaining a transponder, and



- Longer ramp-up period for new facility in region with no or low existing ETC penetration.

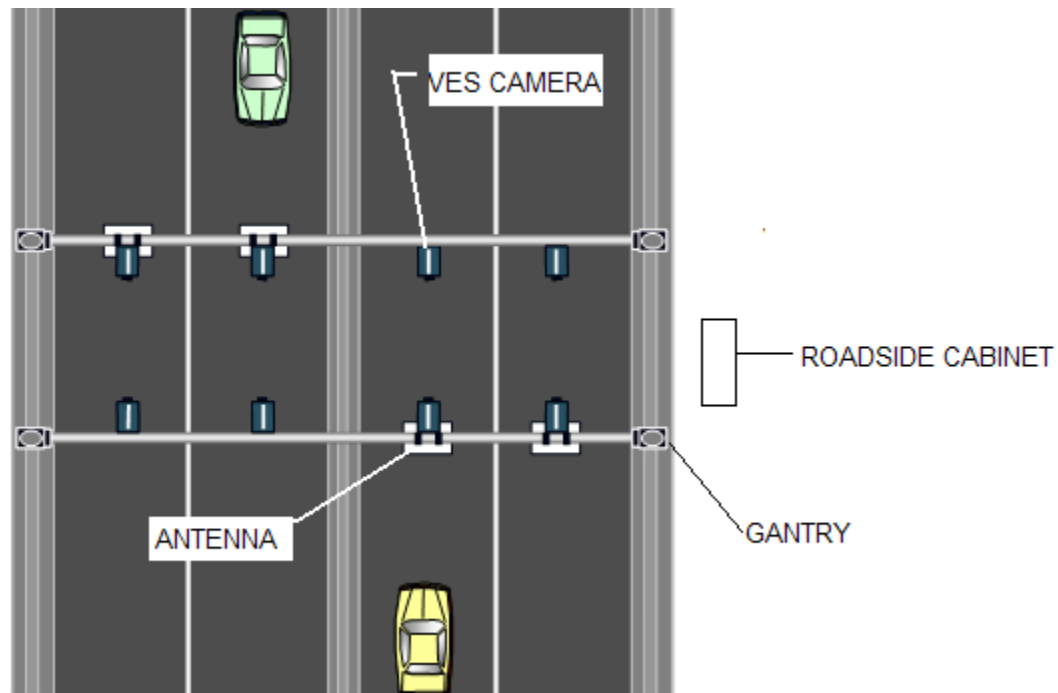


Figure 4.1 Open Road Tolling Layout

The lane level hardware required to implement ORT includes vehicle mounted transponders, overhead antennas, and roadside equipment such as readers, controllers, transmission equipment, electrical circuit protection and distribution, and environmental protection. For violation enforcement, the required lane level equipment includes vehicle detection trigger devices, cameras, and supplemental lighting, as well as image processor and transmission equipment housed in an environmentally controlled roadside cabinet. The violation enforcement system is expected to capture the license plate number and jurisdiction of violators and customers enrolled in the ETC Program whose transponder is not read in the toll lane.

A central processing back office is required to validate lane-level transaction, audit and reconcile the disposition of all transactions, and generate reports. In a general sense, the back office is the area where the selected tolling program for the bridges would be managed. A customer service center and account management system are also required to interact with new and existing customers and automatically write transaction records and payments to the corresponding account, respectively. For a full compliance tested back office operation, 100% of ETC transactions are assumed to be assigned by the account management system to the correct account with payment assured by means of pre-payment or secured post payment from commercial companies.

At the violation processing back office end of an ORT implementation, performance is dependent on the percentage of returned vehicle owner registration information to the quantity of license plates submitted



to a particular DMV. This is dependent on DMV resources, efficiency and quality control processes that are too variable to estimate. Operations cost attributable to back office violation processing is dependent on the percent of captured license plates that can be extracted by optical character recognition (OCR) and the level of confidence of the OCR extractions for a particular confidence interval. A typical percentage range of successful OCR extractions is 70% to 80%. For rear plate only implementation, a manual confirmation is commonly required for all violation transactions. If the percentage of successful ETC transactions is high, manual confirmation is not likely to significantly affect operating cost given a typical processing capability of 600 to 800 image confirmation or extractions per day.

4.2.2 VIDEO TOLLING ALTERNATIVE

Similar to ORT, the video tolling alternative provides for the tolling of vehicles solely through the capture of license plate images and automatically debiting prepaid accounts and posting transactions to invoiced accounts (i.e., postpaid). For this system implementation, all users are identified via video image capture of license plates using multiple cameras and then cross referencing the license plates of users enrolled in the video tolling program. For users not enrolled in the program, an interface with the DMV is needed to identify the registered owner of the vehicle. The System automatically opens an account to accumulate, store and invoice transactions of non-program users in accordance with the business rules.

Contrary to an ORT implementation, violators are not distinguished from valid users at the time of the transaction. Rather, all users are expected to pay tolls through either the debiting of a prepaid program account or invoicing for post payment on a non-program account. For the later case, the business rules should address the measures that are taken if the invoiced amount is not paid by the due date, such as suspension of vehicle registration in addition to the assessment of fines and fees. This effectively delays the identification of violators until after they are afforded an opportunity to pay the invoiced toll charges.

Vendor quoted accuracy of rear plate capture only is approximately 96% of all readable plates and 98% when both front and rear license plates are captured by an image processor. A typical range of unreadable license plates is 5.5% to 12%. Consequently, the best achievable accuracy of capturing the license plate of vehicles for rear camera only and front and rear camera implementations is 90.7% and 92.6%, respectively.

In this type of operation the users are allowed to traverse the tolling zone without any need to stop or reduce speed in order to pay a toll. Similar to ETC, video tolling can be combined with cash collection with the added advantage of no ETC equipment or transponder fulfillment costs are incurred to handle infrequent users and those unwilling or unable to open an account. **Figure 4.2** represents the typical layout of a video tolling zone.

The following are some of the advantages of video tolling:

- Minimizes right-of-way requirements,
- Lowest capital costs to deploy,
- Offers no usage barrier to all willing to pay a toll,
- Simplifies operations (i.e., program and non-program transaction types) and minimizes user confusion.



- Politically attractive solution by not requiring lease or purchase of a transponder nor maintaining an account balance of pre-paid tolls, and
- Shorter ramp-up period for new facility in region having no or low existing ETC penetration.

The disadvantages of video tolling are the following:

- Operational complexity fosters increased resource demand on customer service,
- Subject to business rules, increases revenue recognition time,
- Although mitigated by eliminating manual review of transaction having identical front and rear license plate information, involves a significantly higher quantity of manual confirmations or extractions, resulting in higher operational cost, and
- Deferred identification of violators makes testing mitigation strategies more problematic.

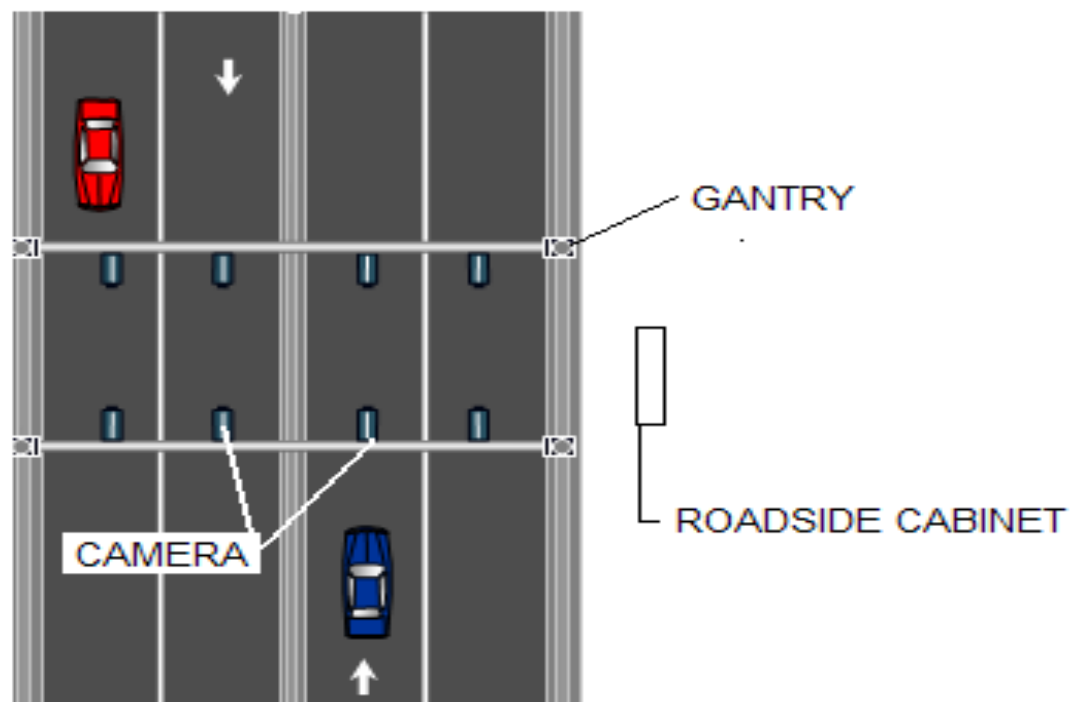


Figure 4.2 Video Tolling Layout

The lane level hardware required to implement video tolling includes vehicle detection trigger devices, cameras with supplemental lighting, as well as a controller, image processor, transmission equipment and electrical circuit protection and distribution housed in an environmentally controlled roadside cabinet. Because of the high volume of image records that must be processed, front and rear license plate capture is mandatory. The same accuracies provided above for violation enforcement with front and rear license plate capture under an ETC implementation apply to video tolling. A reduction in both capital costs related to ETC equipment and operating costs related to transponder fulfillment, maintaining a transponder inventory management system, and a receiving, inspection/testing and shipping (defective



only) operation is offset by a reduction in lane level accuracy. The video tolling benefit of attracting more infrequent users must also be considered. Capturing both front and rear license plate characters eliminates the need for manual confirmation whenever the characters match. For instances when front and rear license plate characters do not match, a manual review and confirmation may be required, particularly if the level of confidence is below a specified threshold. A key distinction between ETC violation processing and video tolling is, for the latter, prospective users would be encouraged to enroll in a Program requiring personal profile and vehicle information that can be used to uniquely identify the vehicle (e.g. car dealer logo, company name, vehicle make/model). This information can be used to reconcile partial capture of license plate characters as well as some other unique characteristic of the vehicle.

Enrolling in a program eliminates the need to interface with the Department of Motor Vehicles (DMV) and thereby, any reduction in system performance. To encourage enrollment in the program, the toll assessed to users who enroll should be less than non-program users who require interfacing with the DMV to obtain registered vehicle owner information. The larger the difference in assessed toll, the less the expected population of non-program users and potential DMV performance reduction. Minimizing the volume of non-program users is important because revenue collection is deferred until the user is invoiced on a particular schedule or when a minimum number of transactions have been recorded to the non-program users' account, or a combination of the two.

Another technique for circumventing a DMV interface is the use of pattern recognition in processing video images of vehicles that were previously captured and identified through a DMV interface. This technique requires the ability of the software to handle variances caused by precipitation, dirt and lighting conditions. Although this technique can also be used for violation processing under an ORT implementation, the much smaller quantity of image records significantly reduces the cost effectiveness of this strategy. Based on the experiences of the 407 ETR in Toronto, Canada and City Link in Melbourne, Australia, video tolling is better suited to handling high ramp up traffic volumes relative to ORT. When the implementation is the first toll facility in a region, video tolling provides a much higher video processing capacity to handle a high percentage of users unfamiliar with operational requirements (e.g., open an account, properly mount a transponder). This can have significant revenue implications for an ORT facility if marketing, media coverage and facility signing are inadequate to reverse the trend in a reasonable time.

4.2.3 VIOLATIONS

Violation rates for both ORT and video tolling implementations are expected to vary by the following:

- region of the county,
- local demographics and socioeconomic conditions,
- local user familiarity, particularly during ramp up,
- percent of out of state traffic affecting familiarity and interaction with other DMVs,
- general compliance with existing traffic regulations (propensity to violate),
- violator/user in-lane identification accuracy,
- the severity and user knowledge of violation fees and fines,
- user perception of the enforcement regimen (i.e., probability of being caught),



- presence of police, and
- attachment of outstanding toll related fees and fines to user fees for other vehicle operating/regulatory requirements.

The above list indicates the difficulty in forecasting the violation rate for a new ORT implementation or percentage of uncollectible tolls for a video tolling implementation. Complicating matters when attempting to make comparisons relative to other agencies is the variation in how ETC violations are defined and, in the case of video tolling, when do outstanding charges effectively become violations. At this time, there are no permanent, exclusive video tolling implementations on a moderate or larger size toll facility operating in the United States. A higher violation rate can be expected during the ramp-up period of a new toll facility that gradually reduces as users become familiar with the operation of the facility, the agency business rules and severity of consequences for violating.

4.3 TOLL SCENARIOS

4.3.1 TOLL ALTERNATIVES

In this study, it was assumed that the facility would allow for all electronic toll collection, with a gantry located on each toll collection location. With the completion of construction of the East-End Bridge and I-65 Downtown Bridge, different combinations of tolled and non-tolled bridges were tested for the four bridges; I-64, US 31, I-65 and East-End bridges. In addition, an option of tolling the Kennedy Interchange was analyzed. In summary, eight tolling alternatives were evaluated as shown in **Table 4.1**.

Table 4.1 Toll Alternatives

Toll Alternative	Facility				
	I-64 Bridge	US 31 Bridge	I-65 Bridge	East-End Bridge	Kennedy Interchange
Alternative 1	◆	◆	◆	◆	
Alternative 2		◆	◆	◆	
Alternative 3	◆		◆	◆	
Alternative 4		◆	◆		
Alternative 5			◆	◆	
Alternative 6			◆		
Alternative 7				◆	
Alternative 8					◆

◆ Tolled

For all bridge toll alternatives, the toll collection points were assumed to be placed in both directions. Tolling locations on the Kennedy Interchange were assumed to be placed at all exit points so that all users of the facility would have to pay. **Figure 4.3** shows the assumed toll collection points on the Kennedy Interchange.

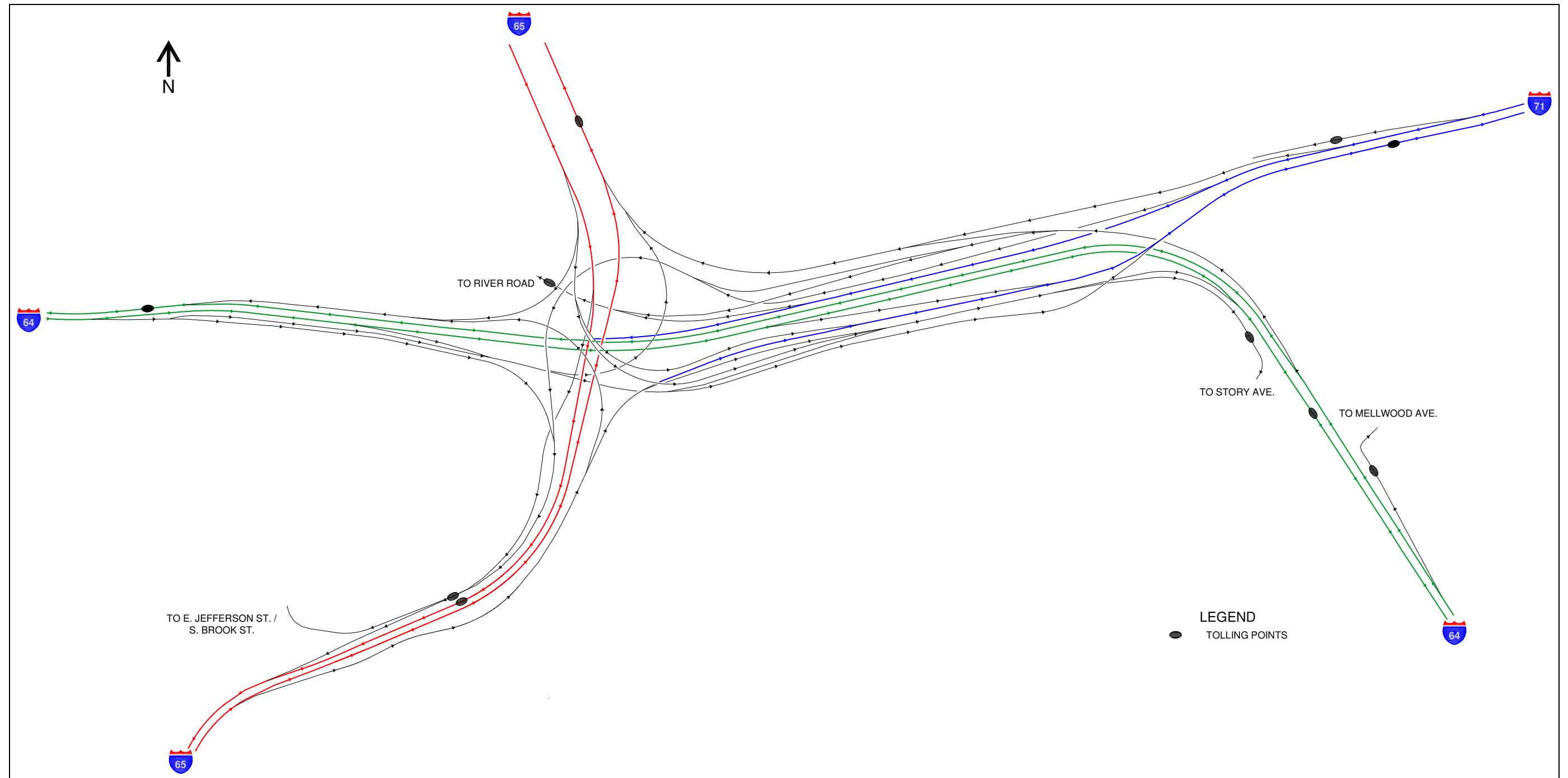


Figure 4.3 Assumed Toll Collection Points for the Kennedy Interchange



4.3.2 TOLL RATE ASSUMPTION

It was assumed that, at each of the toll collection locations, a fixed toll amount is collected, regardless of trip length. Four progressively higher fixed toll rates, ranging from \$0.50 to \$3.00 for passenger cars in 2007 dollars, were tested to establish the toll elasticity for each toll scenario, as shown in **Table 4.2**. The tolls for the 30-year projection period beginning in the opening year of the East-End Bridge, 2013, were prepared by inflating to the respective year using a nominal CPI of 2.5 percent per annum and rounding to the nearest quarter.

To account for proportionately higher pavement wear and tear and maintenance costs associated with trucks as compared to passenger cars, the toll rates for all light and heavy-duty trucks were assumed to be two and three times the passenger car toll rate, respectively. The toll rates by vehicle class were then weighted by the average vehicle composition on the I-64 and I-65 bridges. On average, 82% of total daily traffic on the bridges is composed of passenger cars, 12.9% heavy trucks, and 5.1% light trucks.

Table 4.2 Toll Rate Assumptions*

Year	Toll Rate Assumption			
2007	\$0.50	\$1.00	\$2.00	\$3.00
2013	\$0.50	\$1.25	\$2.25	\$3.50
2014	\$0.50	\$1.25	\$2.50	\$3.50
2015	\$0.50	\$1.25	\$2.50	\$3.75
2016	\$0.50	\$1.25	\$2.50	\$3.75
2017	\$0.75	\$1.25	\$2.50	\$3.75
2018	\$0.75	\$1.25	\$2.50	\$4.00
2019	\$0.75	\$1.25	\$2.75	\$4.00
2020	\$0.75	\$1.50	\$2.75	\$4.25
2021	\$0.75	\$1.50	\$2.75	\$4.25
2022	\$0.75	\$1.50	\$3.00	\$4.25
2023	\$0.75	\$1.50	\$3.00	\$4.50
2024	\$0.75	\$1.50	\$3.00	\$4.50
2025	\$0.75	\$1.50	\$3.00	\$4.75
2026	\$0.75	\$1.50	\$3.25	\$4.75
2027	\$0.75	\$1.75	\$3.25	\$5.00
2028	\$0.75	\$1.75	\$3.25	\$5.00
2029	\$0.75	\$1.75	\$3.50	\$5.25
2030	\$1.00	\$1.75	\$3.50	\$5.25
2031	\$1.00	\$1.75	\$3.50	\$5.50
2032	\$1.00	\$1.75	\$3.75	\$5.50
2033	\$1.00	\$2.00	\$3.75	\$5.75
2034	\$1.00	\$2.00	\$4.00	\$5.75
2035	\$1.00	\$2.00	\$4.00	\$6.00
2036	\$1.00	\$2.00	\$4.00	\$6.25
2037	\$1.00	\$2.00	\$4.25	\$6.25
2038	\$1.00	\$2.25	\$4.25	\$6.50
2039	\$1.00	\$2.25	\$4.50	\$6.50
2040	\$1.25	\$2.25	\$4.50	\$6.75
2041	\$1.25	\$2.25	\$4.75	\$7.00
2042	\$1.25	\$2.25	\$4.75	\$7.00
2043	\$1.25	\$2.50	\$4.75	\$7.25

Note: * Passenger car toll rates



CHAPTER 5

TRAFFIC AND REVENUE ANALYSIS

5.1 TRAFFIC AND REVENUE FORECASTING PROCESS

A travel demand modeling application was utilized to develop traffic and revenue forecasts. **Figure 5.1** depicts a flow chart of the overall traffic and revenue forecasting process. WSA acquired the latest TransCAD travel demand model used by KIPDA and converted into a CUBE model for this study. The CUBE model was then fine-tuned through validation for the base year 2000. Tolling algorithms were added to the validated model to produce a toll diversion model.

Future year assignments were conducted for the years 2013, 2019 and 2030 by modeling no-build, toll-free and different toll scenarios. To prepare for the toll assignments, model networks were developed for the varying toll scenarios. In addition, trips were redistributed to reflect the effect of the impedance imposed by toll on the toll facility. For each toll scenario, the network and redistributed trip table were then input to the toll diversion model to produce traffic forecasts for the years 2013, 2019 and 2030. Based on these forecasts, the forecasts for interim and out years were interpolated and extrapolated.

Annual toll transactions for future years were extracted from the toll model runs. Toll operations and maintenance costs were estimated based on the toll transactions. Annual gross and net toll revenues were estimated from the toll transactions and the toll operations and maintenance costs.

Presented below is a brief discussion on the major elements of the forecasting process.

5.1.1 TRAVEL DEMAND MODEL

The KIPDA TransCAD travel demand model was used as the foundation for developing the toll diversion model. The model includes networks and trip tables for years 2000, 2009, 2012, 2020 and 2030. The model covers five counties in the KIPDA region: Jefferson, Bullitt and Oldham counties in Kentucky and Clark and Floyd counties in Indiana. The future year networks are coded with phased Transportation Plans. Each network is accompanied by daily trip tables for all vehicles. The trip tables are disaggregated into inter-state and intra-state trips.



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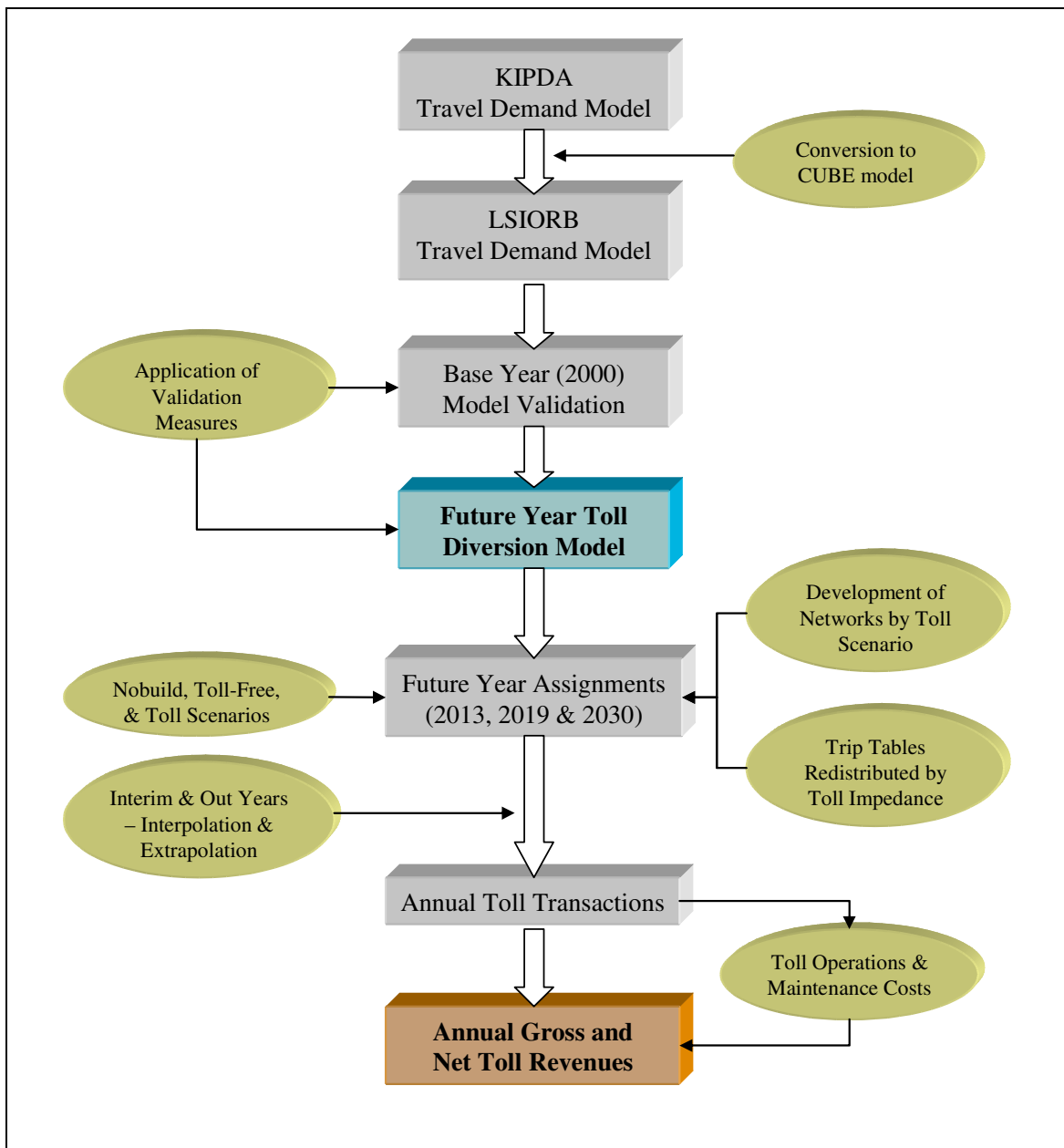


Figure 5.1 Traffic and Revenue Forecasting Process



The model area consists of 855 traffic analysis zones (TAZs) and external stations, as follows:

- 638 TAZs in Kentucky
- 24 external stations in Kentucky
- 169 TAZs in Indiana
- 24 external stations in Indiana

The KIPDA model was converted to the CUBE/VOYAGER platform. The following networks and trip tables were developed based on the KIPDA data sets:

- Base Year 2000 network and trip table
- Opening year 2013 network with Transportation Plan and trip table
- Interim year 2019 network with Transportation Plan and trip table
- Horizon year 2030 network with Transportation Plan and trip table

Each network was reviewed for its correct representation of link speeds and number of lanes. Future year networks reflected roadway improvements/additions specified in the Transportation Plan.

5.1.2 MODEL VALIDATION

Model validation tests the ability of the model to closely replicate the existing travel patterns before it can be used to produce reliable forecasts. Model validation was performed for year 2000 as the base year by comparing observed counts with estimated traffic volumes. In this study, model validation was limited to network-based adjustments that included verification of counts, correction of speeds and capacities, and application of facility-based volume-delay functions.

Before validation, the counts coded in the KIPDA model base year network were reviewed for their validity. Subsequently, A major effort was made (1) to collect and code additional ground counts on urban and rural interstates and other major highways to cover more extensive area and (2) to verify the validity of the counts on critical links such as the bridges and urban interstates leading to downtown Louisville.

Criteria for acceptable errors between observed and estimated traffic volumes vary by facility type, according to the magnitude of traffic volume usage. For example, higher volume roadways have more strict validation guidelines than those with lower volumes. The Federal Highway Administration (FHWA) defines acceptable error thresholds by volume group as shown in **Table 5.1**. In comparison with the FHWA standard, the table provides model output from the validated base year model. As indicated in the table, the validated model produced the errors far below the FHWA's thresholds.



Table 5.1 Base Year Validation Statistics by Volume Group

Volume Range	Average Count	Average Loading	% Difference	FHWA Standard
1,000 to 2,500	1,589	1,771	11.4%	47.0%
2,501 to 5,000	4,067	4,656	14.5%	36.0%
5,001 to 10,000	7,689	7,131	-7.3%	29.0%
10,001 to 25,000	15,598	14,750	-5.4%	25.0%
25,001 to 50,000	33,032	32,978	-0.2%	22.0%
Over 50,000	68,136	70,701	3.8%	21.0%
All	16,610	16,441	-1.0%	

Note: The volume is in vehicles/day

In addition to the FHWA's error standard, the Percent Root Mean Square Error (% RMSE) is the traditional and single-best overall error statistic used for comparing loadings to counts. It has the following mathematical formulation:

$$\%RMSE = \frac{\sqrt{\sum (\text{Count} - \text{Loading})^2 / n}}{\text{Mean Count}} \times 100$$

A model is in a high degree of calibration when the % RMSE of the network as a whole is in the range of 20% to 30%. In this study, the validated model produced an overall % RMSE of 21.9%.

Table 5.2 provides screenline statistics from the validated model. The screenlines were set at the bridges on the Ohio River, which include I-64, US 31 and I-65 bridges. As indicated in the table, the model's loading error is limited to 1.5% for all river crossings with a % RMSE of 6.1%.

Table 5.2 Base Year Validation Statistics by Screenline

Ohio River Crossing	Traffic Volume			
	Average Count	Average Loading	% Difference	% RMSE
I-64	86,300	82,656	-4.2%	3.0%
US 31	19,600	20,817	6.2%	12.2%
I-65	124,750	130,564	4.7%	3.6%
Average	76,883	78,012	1.5%	6.1%

Note: The volume is in vehicles/day for both directions

In addition to the volume-based validation presented above, the base year model was validated for its representation of traffic flow speed. As described in Chapter 2, speed runs were conducted for this study on all urban interstates and river crossings, including I-65, US 31, I-64 and I-71. The speeds estimated from the KIPDA model represent peak hour conditions. From the speed runs, the speeds collected in the a.m. and p.m. peak periods were extracted and the lower speeds in the peak periods were used for model validation.



Table 5.3 presents a comparison between modeled speeds from the validated model run and observed speeds from the speed runs for the river crossings. The table indicates that the model replicates the observed speeds with a difference of 2.6% and a % RMSE of 34.5%.

Table 5.3 Base Year Speed Validation

Ohio River Crossing	Speed			
	Observed	Modeled	% Difference	% RMSE
I-64	48.0	45.2	-5.9%	4.8%
US 31	26.0	20.3	-22.1%	29.2%
I-65	30.0	35.8	19.5%	35.8%
Average	34.7	33.8	-2.6%	34.5%

Note: * The speed is in miles per hour
* Observed Speed = lower speed of AM and PM peak speeds by direction, then averaged over both directions
* Modeled Speed = the model-output averaged over both directions

5.1.3 SOCIOECONOMIC FORECASTS

The travel demand model used for the revenue estimation process is based on the forecasts of socioeconomic variables such as population, households, and employment. The socioeconomic forecasts are used to generate vehicular trips that are, in turn, assigned on the transportation network. This study investigated the latest available forecasts from the KIPDA travel demand model. The model contained the socioeconomic forecasts for base year 2000 and horizon year 2030, with the forecasts for interim years 2009, 2012 and 2020. A major effort was made on verifying the socioeconomic growths projected in these models and their correlation to the trip-end growths.

Figure 5.2 depicts the 2000 and 2030 household distribution for the KIPDA model area. The 2000 household distribution shows household concentrations in the Louisville urban area inside I-265. In year 2030, most household growth is forecasted to happen further away from the city center in newly developed areas around the city along I-65 to the north in Clark County, I-71 in Oldham County, and I-65 to the south in Bullitt County. Significant growth is expected along state road 3 in Clark County south of Charlestown. The overall growth pattern is illustrated by **Figure 5.3**, which shows the change in number of households between 2000 and 2030 for the KIPDA model area.

Figure 5.4 presents the total employment forecast for the KIPDA model area. Most of the employment is currently concentrated in the Louisville metro area inside I-265 and Clarksville and Jeffersonville in Indiana. Significant growth in employment is anticipated by year 2030 in the areas along I-65, I-64 and I-265. The area inside I-265 is forecasted to grow steadily by 2030. High growth is expected along state road 3 in Clark County between Jeffersonville and Charlestown. The overall growth pattern can be seen more clearly in **Figure 5.5**, which presents the forecasted change in employment between 2000 and 2030.

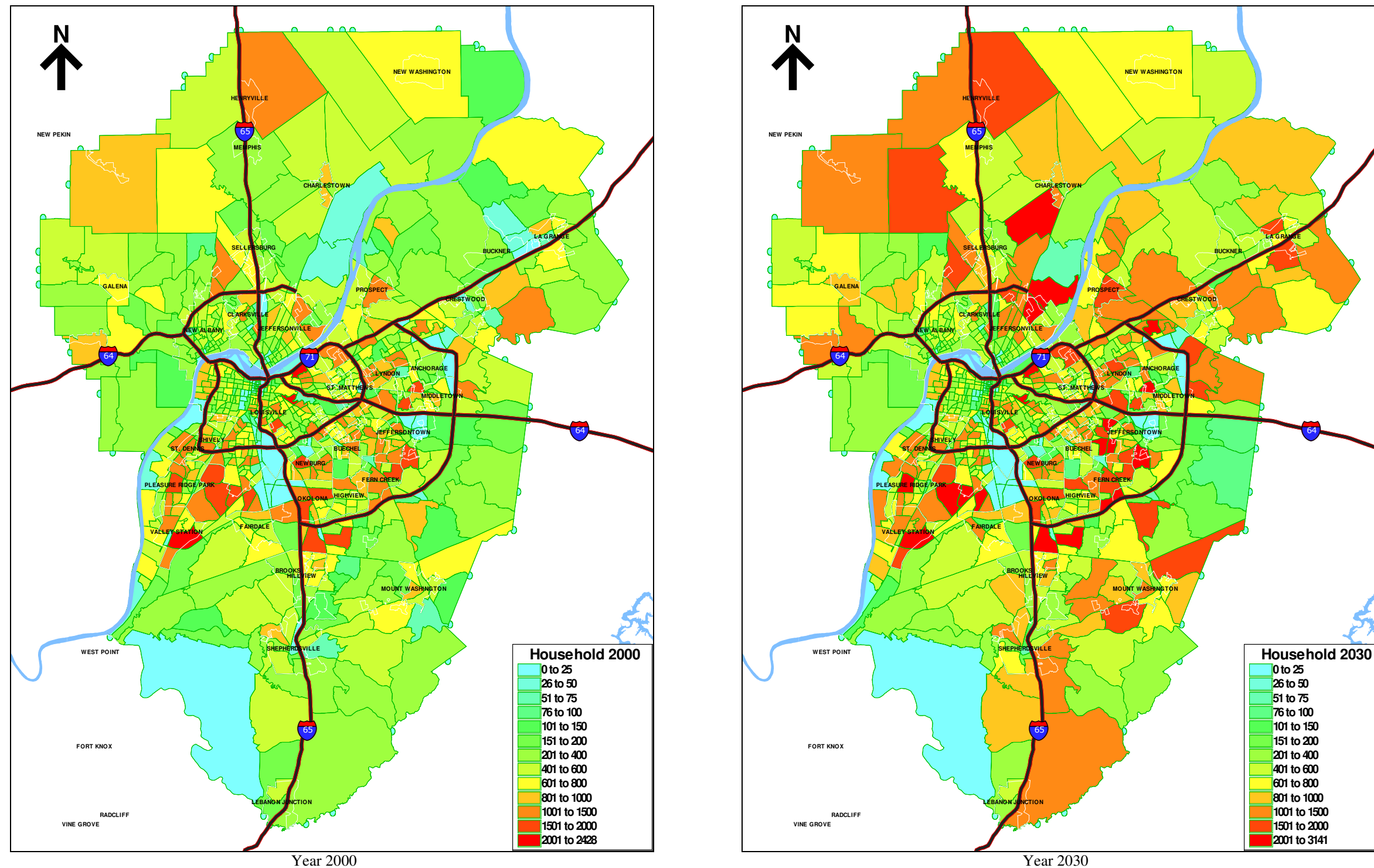


Figure 5.2 Household Forecasts



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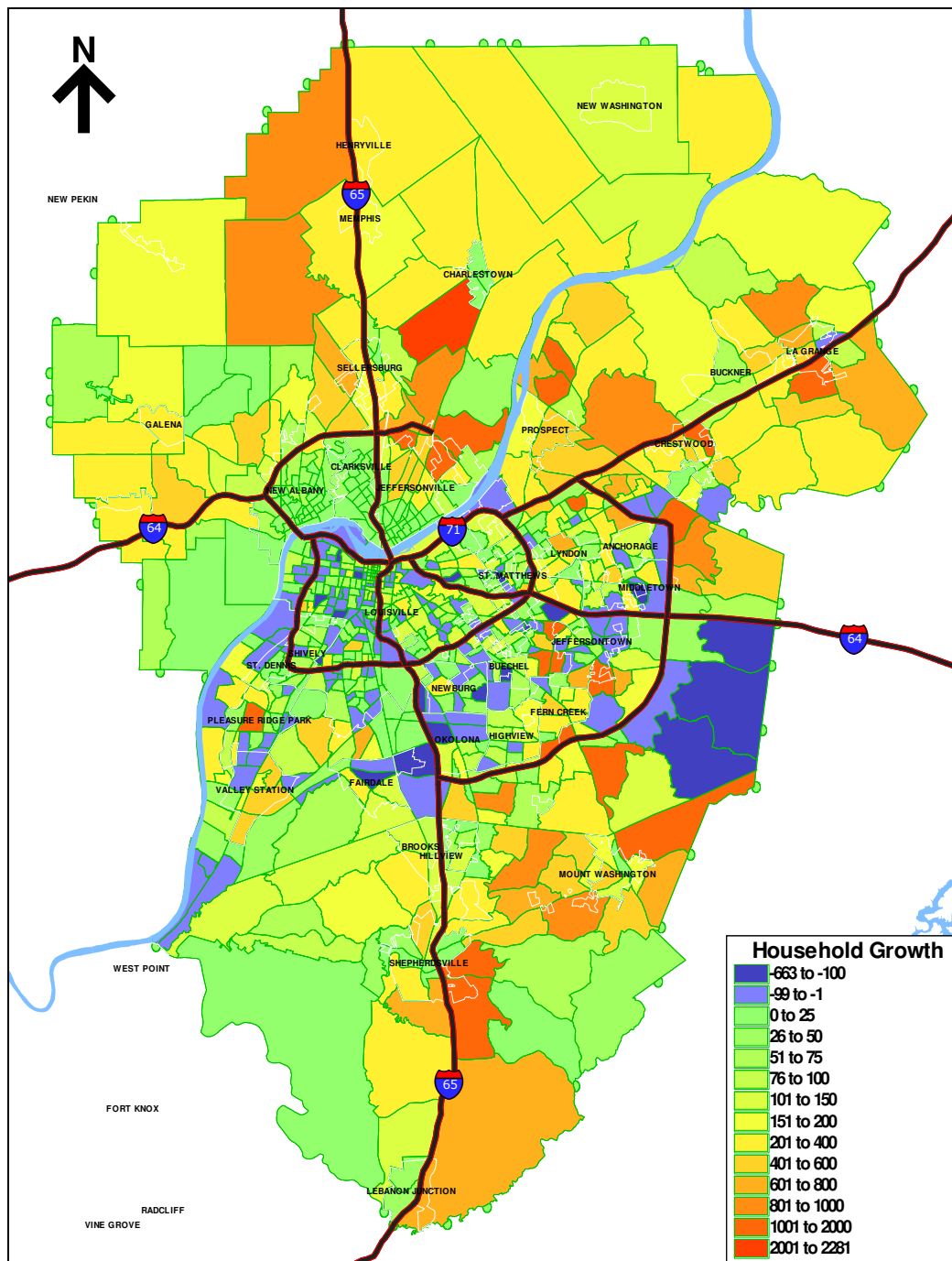


Figure 5.3 Household Growth (2000 to 2030)

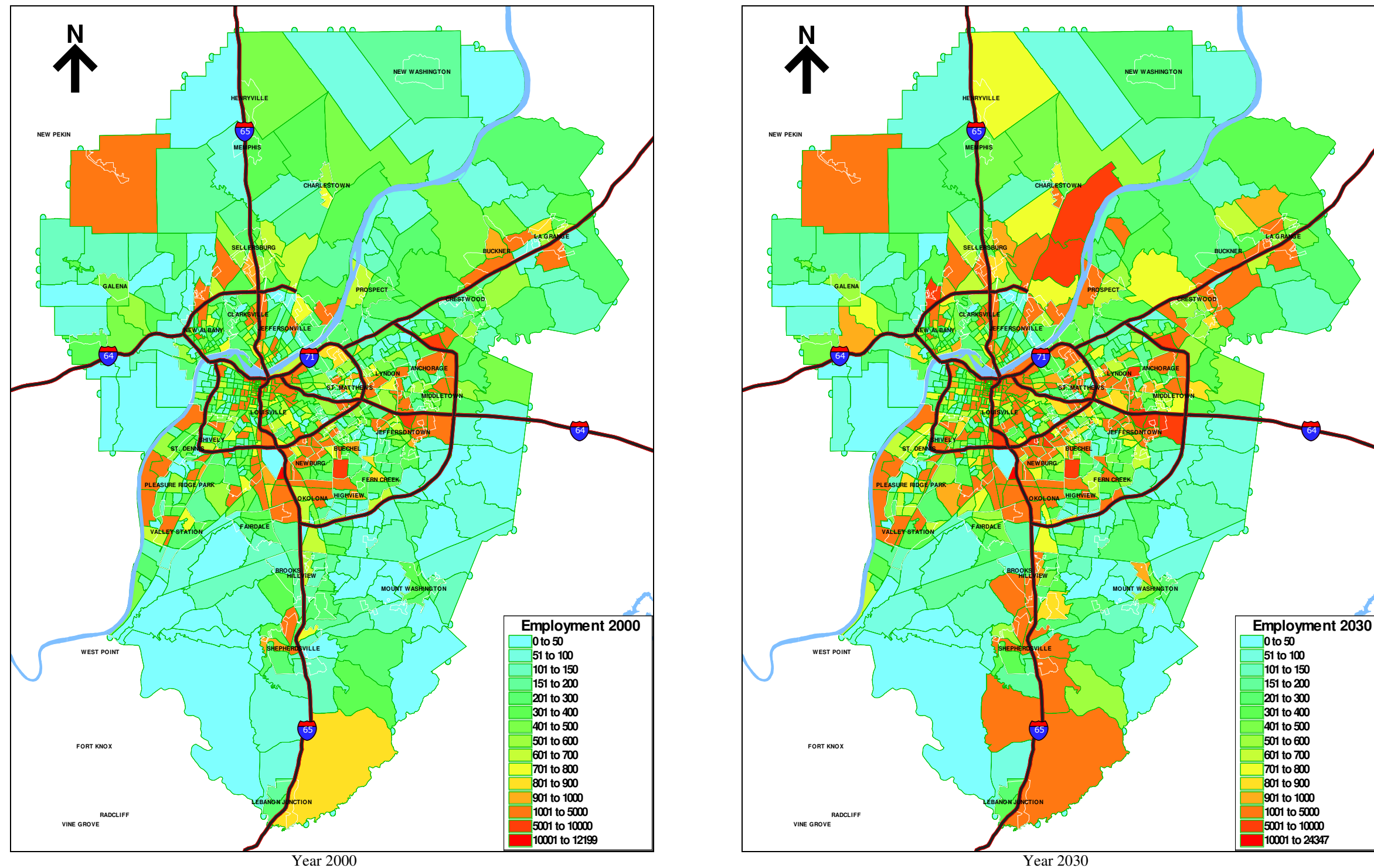


Figure 5.4 Employment Forecasts



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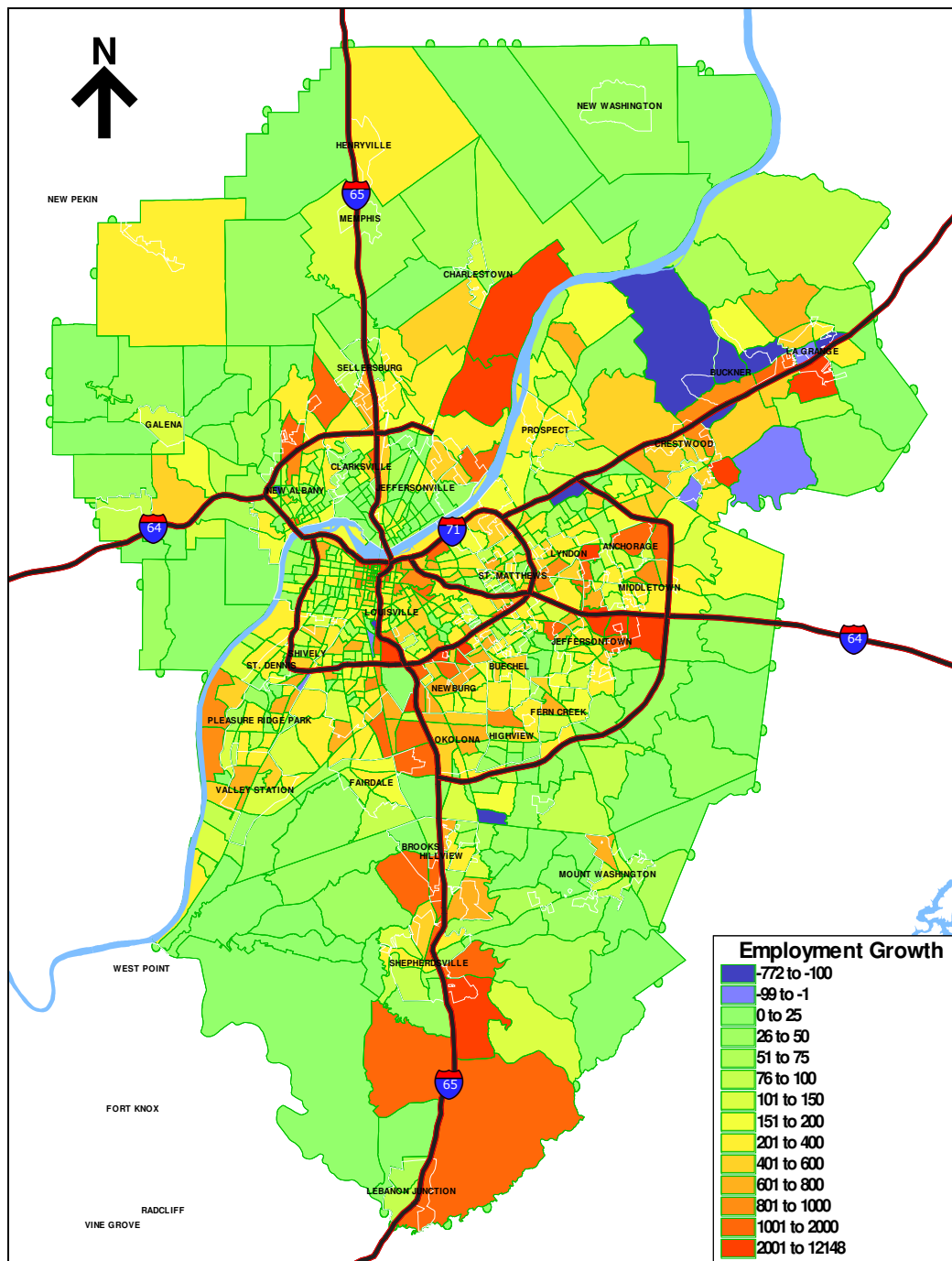


Figure 5.5 Employment Growth (2000 to 2030)



5.1.4 TRIP-END GROWTH ANALYSIS

WSA studied the growth forecasted in the year 2030 trip table by reviewing the trip-end distribution forecast that resulted from the trip generation and distribution steps. Trip-ends were directly correlated to household and employment forecasts described in the previous section and followed similar trends. **Figure 5.6** illustrates trip-ends in years 2000 and 2030. **Figure 5.7** exhibits the change in trip-ends from year 2000 to year 2030. As indicated in these figures, high growth is forecasted for the areas along I-65 in Kentucky and Indiana and I-71. Significant growth is expected along state road 3 in Clark County between Jeffersonville and Charlestown.

5.1.5 TOLL DIVERSION METHODOLOGY

A toll diversion model was used to estimate the market share of toll and non-toll facilities based on factors such as value of time, operating cost, toll cost, and congestion. An algorithm was used to determine the minimum time path between each zone pair. The minimum time path may or may not include the use of the proposed toll facility.

For the trips that may potentially use the toll facility, travel time of the toll facility routing was compared with that of the best alternative route not involving a toll payment. A share of the total traffic moving between each pair of zones is then assigned to the toll facility routing, while the remaining portion is assigned to the best toll-free alternative route. The model's estimate of the toll facility's market share is a function of time savings, toll rate, and estimates of perceived value of time and operating costs by the motorists.

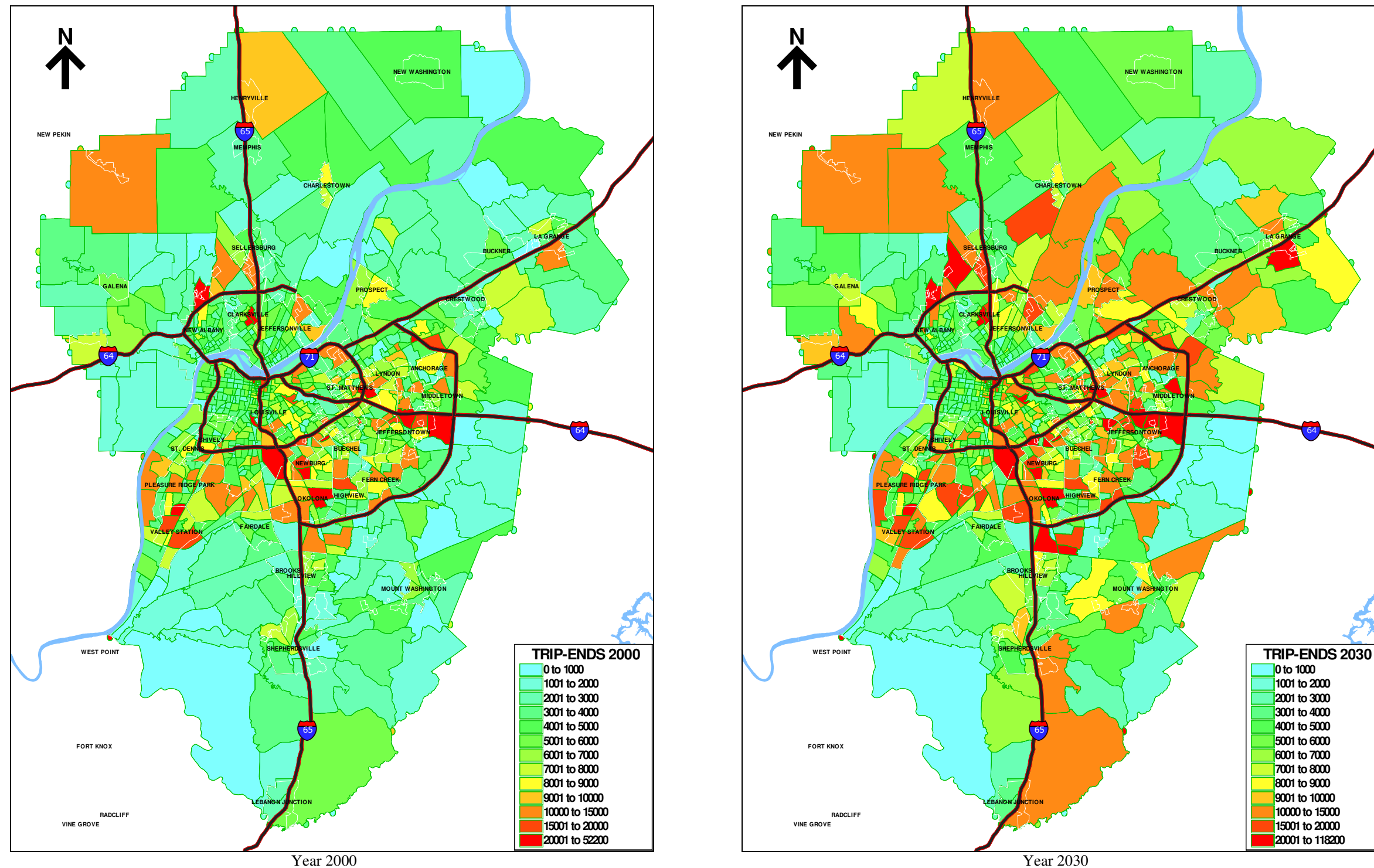


Figure 5.6 Trip-End Forecasts



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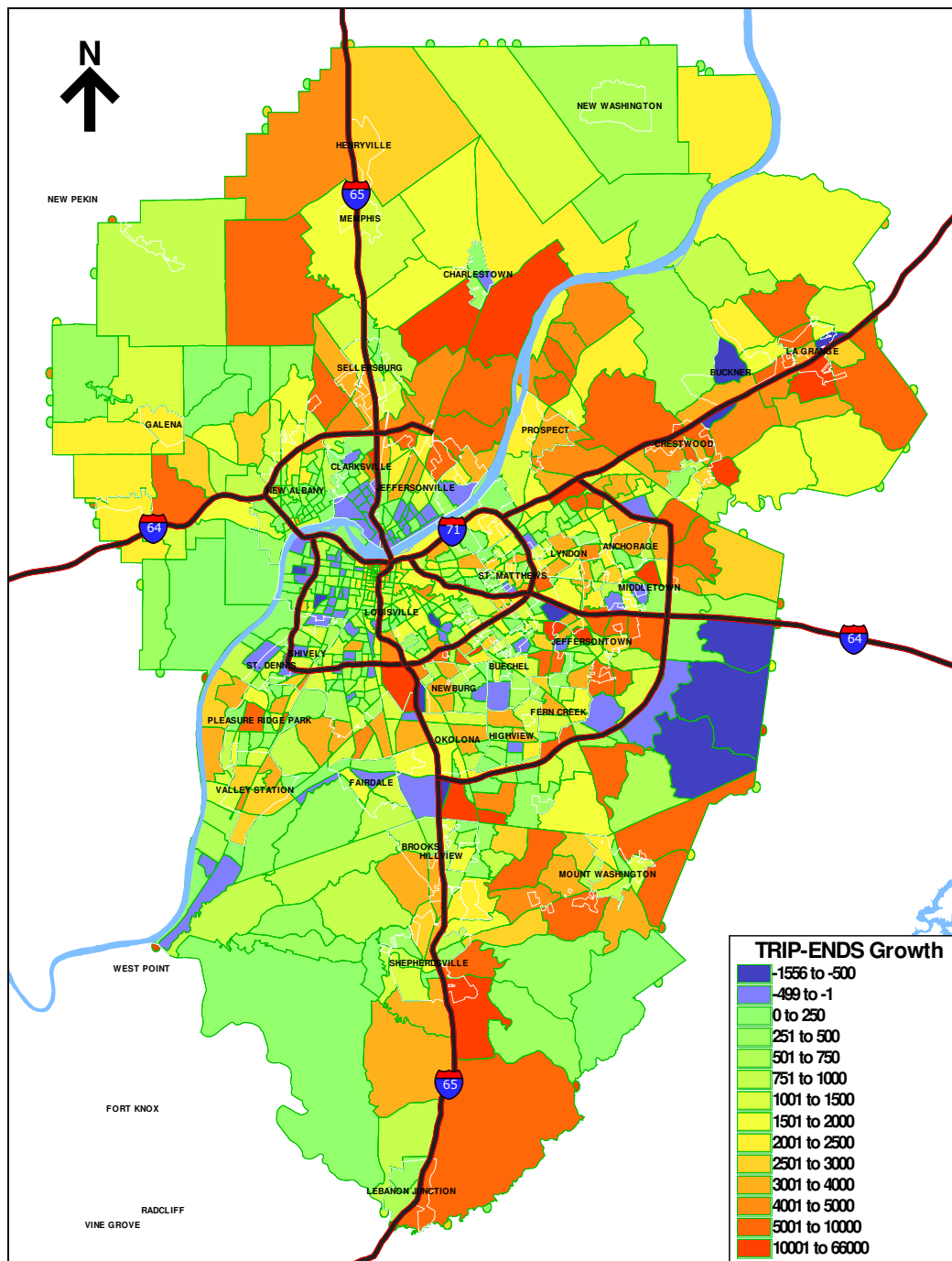


Figure 5.7 Trip-End Growth (2000 to 2030)



5.1.6 PLANNED TRANSPORTATION IMPROVEMENTS

WSA reviewed Louisville area transportation improvement projects to reflect the projects in the future year networks. **Table 5.4** presents a selection of the major transportation projects in the study area that are listed in the Long-Range Transportation Plan, Horizon 2030 prepared by KIPDA. The Plan reflects all surface transportation investments for at least the next 20 years in the Louisville Metropolitan Planning Area. This study only considered expansion or capacity adding projects in the KIPDA Long-Range Transportation Plan. Major projects include the improvements on I-64, I-65, I-264, I-265 and I-71.

Table 5.4 Selection of Major Capacity Adding Projects

Project Name	Location	Description	Project Cost (in million \$)	Estimated Completion
I-64	Kentucky	Widen from I-265 to the KY 53 interchange	\$12.6	2008
I-265	Kentucky	Improve I-265/KY 155 interchange	\$1.0	2009
KY 61	Kentucky	Widen KY 61 from Shepherds Way to Shepherdsville	\$50.2	2010
US 42	Kentucky	Widen from Jefferson/Oldham Co. line to Ridgemoor Dr.	\$7.5	2011
I-71	Kentucky	Addition of auxiliary lanes on I-71 near the Kennedy interchange	\$20.9	2012
I-264	Kentucky	Construct new I-264 interchange at KY 1447	\$32.0	2012
I-265	Kentucky	Reconstruct I-265 interchange at I-64	\$85.5	2012
KY 22	Kentucky	Widen from KY 329 to KY 329B and from KY 329B to Abbott Ln	\$13.6	2012
I-65	Indiana	Widen from Ohio River to Conrail Railroad	\$50.0	2013
US 60	Kentucky	Add 1 lane in each direction on US 60 from I-264 to KY 1747	\$20.0	2013
I-264	Kentucky	Add 1 lane in each direction on I-264 from KY 1447 to I-71	\$7.5	2015
I-265	Kentucky	Widen I-265 from 4 to 6 lanes from I-65 to US 31E	\$50.0	2015
KY 53	Kentucky	Widen KY 53 from KY 22 at Ballardsville to Zhale Smith Rd	\$30.0	2015
US 60	Kentucky	Widen from KY 1747 to I-265	\$30.0	2015
I-64	Indiana	Widen I-64 from 5 to 6 lanes from I-265 to IN 111	\$17.7	2016
I-64	Kentucky	Widen between I-71 & I-264	\$50.0	2016
I-65	Indiana	Added travel lanes on I-65 from Memphis Rd. to IN 160	\$69.8	2017
I-265	Kentucky	Widen I-265 from 4 to 6 lanes from I-64 to I-71	\$70.0	2018
I-64	Kentucky	Widen I-64 between I-264 & KY 1747	\$4.0	2020
I-265	Kentucky	Widen I-265 from 4 to 6 lanes from US 31E to I-64	\$65.0	2020
KY 22	Kentucky	Widen KY 22 from 2 to 5 lanes from Haunz Ln. to KY 329	\$9.0	2020
KY 22	Kentucky	Widen KY 22 from just east of KY 1694 to Haunz Ln	\$8.0	2020
KY 44	Kentucky	Widen KY 44 from Floyds Fork Bridge to US 31E	\$30.0	2020
KY 155	Kentucky	Widen KY 155 from 2 to 3 lanes from I-265 to KY 148	\$5.0	2020
KY 864	Kentucky	Widen KY 864 from 2 to 3 lanes from KY 864 to KY 864	\$12.0	2020
KY 907	Kentucky	Widen KY 907 from 2 to 5 lanes from US 31W to KY 1865	\$35.0	2020
I-64	Indiana	Widen I-64 from US 150 to I-265	\$60.7	2025
KY 146	Kentucky	Widen KY 146 from 2 to 4 lanes from Button Ln. to KY 393	\$13.5	2025
KY 146	Kentucky	Widen KY 146 from 2 to 4 lanes from KY 329 to KY 393	\$15.3	2025
I-64	Indiana	Widen I-64 from 5 to 6 lanes from IN 62/IN 64 to US 150	\$8.0	2030
I-265	Indiana	Widen I-265 from 4 to 6 lanes from I-64 to I-65	\$319.7	2030
IN 62	Indiana	Widen IN 62 from 2 to 4 lanes from IN 3 to IN 362	\$29.0	2030

Source: The Long-Range Transportation Plan, Horizon 2030, KIPDA, 2007



5.2 TOLL RATE SENSITIVITY ANALYSIS

The primary purpose of performing toll sensitivity analysis is to test the impact of increasingly higher toll rates on toll revenue generation. As tolls are increased, the toll facility becomes relatively less attractive compared to the alternative routes. At some threshold level, a patron will shift to what he or she feels is the less costly alternative routing.

Toll rate sensitivity analysis was conducted for Alternative 7 (tolling the East-End Bridge only) under the assumed toll rates, ranging from \$0.50 to \$3.00 for passenger cars. **Figure 5.8** depicts the sensitivity of annual transactions and toll gross revenues in the opening year 2013 to the assumed toll rates for Alternative 7. All revenue numbers are presented in nominal dollars.

Alternative 7 shows that total annual toll transactions fall by 32 percent, going from the \$1.00 toll to the \$2.00 toll. At the same time, total annual toll gross revenues increase by 22 percent. As the toll rate increases from \$2.00 to \$3.00, total transactions further decrease by 38 percent and total annual revenues decrease by 4 percent. The trendline of the gross revenues in **Figure 5.8** indicates that the gross revenues peak at the toll rate of about \$2.25. Beyond this rate, the revenues decline due to high traffic diversion off the East-End Bridge.

It should be noted that though this analysis was based on accepted techniques, motorists' toll sensitivity is a function of multiple factors. Perceived values of time, congestion and various situational considerations all interact and influence motorists. As a result, there is a certain inherent margin of error in this type of analysis. Prudence would suggest not selecting the toll rate that maximizes toll revenues, but rather, a toll rate on the upward sloping side of the revenue maximization curve. This would provide some rate adjustment flexibility in case the initial revenue realization turns out below expected levels.

5.3 COMPARATIVE TOLL ANALYSIS

To compare with the toll rates tested for this study, toll rates levied on existing toll bridges in the United States were reviewed. Passenger car toll charges for both cash and ETC collections were assembled from a representative sample of toll bridges across the country. On many of the toll bridges, tolls are collected one-way only. **Table 5.5** summarizes effective one-way toll rates on toll bridges. The toll bridges represent a geographical cross-section. For the toll bridges investigated, the average toll rate for cash collection is \$1.86 and the median is 2.00. For the ETC rates, the average is \$1.43 and the median is \$1.00.



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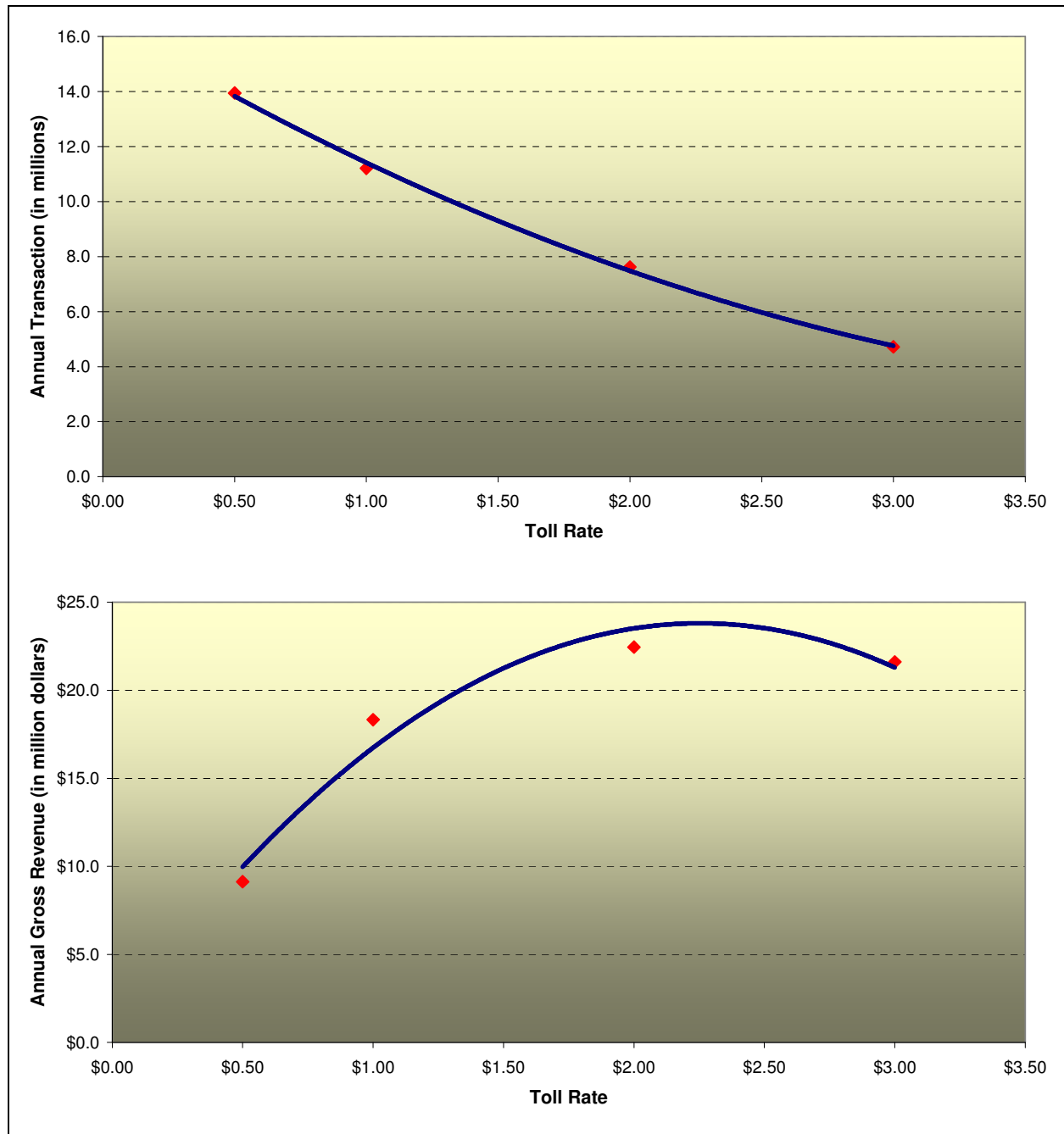


Figure 5.8 Toll Rate Sensitivity (Alternative 7, Year 2013)



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Table 5.5 Comparison of Toll Rates

Bridge	Owner/Authority	Toll Rate*	
		Cash	ETC
Mackinac	Mackinac Bridge Authority	\$2.50	N/A
Ambassador (MI)	Detroit International Bridge Company	\$3.75	\$3.40
Antioch	Bay Area Toll Authority	\$2.00	\$2.00
Benicia-Martinez	Bay Area Toll Authority	\$2.00	\$2.00
Carquinez	Bay Area Toll Authority	\$2.00	\$2.00
Dumbarton	Bay Area Toll Authority	\$2.00	\$2.00
Richmond-San Rafael	Bay Area Toll Authority	\$2.00	\$2.00
San Fran-Oakland Bay	Bay Area Toll Authority	\$2.00	\$2.00
San Mateo-Hayward	Bay Area Toll Authority	\$2.00	\$2.00
Delaware River Bridges	DRJTBC	\$0.38	\$0.23
New Hope-Lambertville Toll Bridge	DRJTBC	\$0.75	\$0.45
I-78 Toll Bridge	DRJTBC	\$0.38	\$0.23
Cape Coral	Lee County, FL	\$1.00	\$1.00
Midpoint	Lee County, FL	\$1.00	\$1.00
Sanibel	Lee County, FL	\$3.00	\$3.00
Sunshine Skyway	FDOT	\$1.00	\$0.75
Delaware Memorial Bridge	Delaware River and Bay Authority	\$1.50	\$0.38
Greater New Orleans Bridges	Louisiana Dept. of Transportation	\$1.00	\$0.40
William Preston Bay Bridge (MD)	Maryland Trans. Authority	\$1.25	\$0.50
TJ Hatem Memorial (MD)	Maryland Trans. Authority	\$2.50	\$0.40
Lake Ponchartrain Causeway	GNOEC	\$3.00	\$2.00
Tobin Memorial Bridge (MA)	Massport	\$1.50	\$0.15
G. Washington, Goethals, Outerbridge, Bayone Bridge	PANYNJ	\$3.00	\$2.50
Rip Van Winkle, Kingston-Rhinecliff, Mid-Hudson, Newburgh-Beacon, Bear Mountain	NYSBA	\$1.00	\$0.50
Verrazano-Narrows	Metropolitan Transp. Auth.	\$4.50	\$4.00
Triborough, Bronx-Whitestone, Throgs Neck	Metropolitan Transp. Auth.	\$4.50	\$4.00
Henry Hudson	Metropolitan Transp. Auth.	\$2.25	\$1.75
Gil Hodges Memorial, Veterans Memorial	Metropolitan Transp. Auth.	\$2.25	\$1.50
B. Franklin, Walt Whitman, Betsy Ross, Commodore Barry	DRPA	\$3.00	\$2.00
Pell Bridge Newport	Rhode Island TBA	\$2.00	\$0.84
Mountain Creek Lake (TX)	NTTA	\$0.50	\$0.50
Lewisville Lake (TX)	NTTA	\$1.25	\$1.00
Boulevard Bridge (VA)	Richmond Metro Auth.	\$0.25	\$0.25
George P. Coleman Bridge	VDOT	\$1.00	\$0.43
Tacoma Narrows	Washington DOT	\$1.50	\$0.88
Montgomery Expressway/ Alabama River Parkway	Alinda Roads	\$1.25	N/A
Golden Gate Bridge	Highway and Transportation District	\$2.50	\$2.00
Chicago Skyway	Chicago Skyway	\$2.50	\$2.50

* These rates are effective one-way toll rate. For a comparison purpose, the tolls collected one-way only are divided by two.

Source: International Bridge, Tunnel and Turnpike Association



5.4 TOLL TRANSACTION AND REVENUE FORECASTS

The forecasted toll transactions and revenues were based on the model data sets, including the socioeconomic forecasts and the planned improvements, which included the future transportation plans. The toll diversion model was built on the data sets to produce future toll transaction and revenue forecasts.

5.4.1 TRAVEL DEMAND MODEL RUNS

As part of deriving the forecasts, WSA conducted traffic assignments for the following scenarios:

- No-build
- Build with no toll
- Build with toll

The no-build assignment was run for year 2030 by assuming absence of the LSIORB project except other long-range plans. The build with no toll option was run for the same year to investigate the market area of the LSIORB project and to diagnose the model's sensitivity in producing forecasts with and without the project. The build with toll option included eight toll alternatives as specified in **Table 4.1**. For each of the toll alternatives, traffic assignments were run for years 2013, 2019 and 2030. The forecasts for interim years were interpolated based on the assignments.

5.4.2 TRAFFIC FORECASTS

After each of the travel demand model runs, the results of the model assignment were reviewed for their reasonableness relative to the model run scenario. The reasonableness check included a comparison of screenline traffic by run scenario. **Table 5.6** summarized the screenline traffic from the 2030 no-build and toll-free assignments as compared to that from the base year 2000 assignment.

Compared to the base year traffic, total number of traffic crossing the Ohio River in the 2030 no-build case was projected to increase by about 132,000 vehicles daily, an increase of about 56%. Addition of the East-End and the I-65 northbound bridges would draw more river-crossing traffic, additional 14,430 vehicles as compared to the no-build case. The East-End Bridge would carry about 59,000 vehicles in the 2030 toll-free scenario, while the traffic volumes on the I-64, US 31 and I-65 bridges would drop as compared to those in the no-build scenario.

Table 5.6 Screenline Traffic by Model Run Scenario (2030)

Run Scenario	Ohio River Crossings				Total
	I-64	US 31	I-65	East-End Bridge	
Base 2000	82,660	20,820	130,560	n/a	234,040
No-Build 2030	154,300	23,720	187,930	n/a	365,950
Toll-Free 2030	121,360	18,430	181,590	59,000	380,380



Traffic forecasts for the eight build alternatives were prepared for the assumed toll rates of \$0.50, \$1.00, \$2.00 and \$3.00. **Figures 5.9** through **5.16** present the schematics showing the forecasted daily traffic volumes on tolling locations for alternatives 1 through 8, respectively. In each graphic, the forecasted volumes are presented for years 2013, 2019, 2025 and 2030. The traffic forecasts are prepared for each of the four toll rates tested.

As described in Chapter 4, the eight alternatives are defined as follows:

- Alternative 1: Toll all four bridges (I-64, US 31, I-65 and East-End bridges)
- Alternative 2: Toll US 31, I-65 and East-End bridges
- Alternative 3: Toll I-64, I-65 and East-End bridges
- Alternative 4: Toll US 31 and I-65 bridges
- Alternative 5: Toll I-65 and East-End bridges
- Alternative 6: Toll I-65 bridge
- Alternative 7: Toll East-End bridge
- Alternative 8: Toll the Kennedy Interchange

It should be noted that, for all alternatives, traffic and revenue forecasts were prepared annually beginning in 2013, regardless of the staged completion schedule of the six sections of the LSIORB project. For example, the forecasts for the Kennedy Interchange were extended for years 2013 through 2024, even though the relocation of the Kennedy Interchange is not scheduled to be complete until 2025. The extension of the forecasts was done for a comparison purpose between alternatives.

For Alternative 1 in which all four bridges are assumed to be tolled, the traffic volume at the I-65 toll locations, for the \$2.00 toll, grows from 121,400 vehicles in year 2013 to about 155,900 vehicles in year 2030, at an average annual rate of 1.5 percent. For the same alternative and the same toll rate, the East-End Bridge is forecasted to carry 38,300 in 2013 and 51,000 in 2030, at an annual rate of 1.7 percent.

In Alternative 2, the I-64 bridge is assumed as a toll-free facility, which resulted in a high increase in traffic volume on the I-64 bridge. At the same time, traffic volumes on other three bridges decrease as compared to the traffic volumes in the Alternative 1 scenario.

Traffic volumes for Alternative 3 are similar to those for Alternative 1. The US 31 and I-65 bridges would carry more traffic. Alternatives 1 and 3 are forecasted to generate the highest number of toll transactions among the eight toll alternatives. The lowest number of toll transactions can be found in **Figure 5.15** in which traffic forecasts for Alternative 7 are shown. The tolled East-End Bridge is forecasted to carry 21,800 vehicles in the opening year 2013 and 30,100 vehicles in 2030 for the toll rate of \$2.00. In this scenario, the I-65 bridge would carry the highest traffic, 152,600 vehicles in 2013 and 196,500 vehicles in 2030.

Figure 5.16 presents traffic forecasts for Alternative 8 in which the Kennedy Interchange is assumed a toll facility. Of the ten tolling locations, the tolling point at the I-65 northbound exit would carry the highest number of traffic, 42,800 vehicles in 2013 and 56,400 vehicles in 2030 under the \$2.00 toll assumption. For the same toll rate, the I-65 southbound mainline is projected to accommodate 22,500 vehicles in 2013 and 28,200 vehicles in 2030.

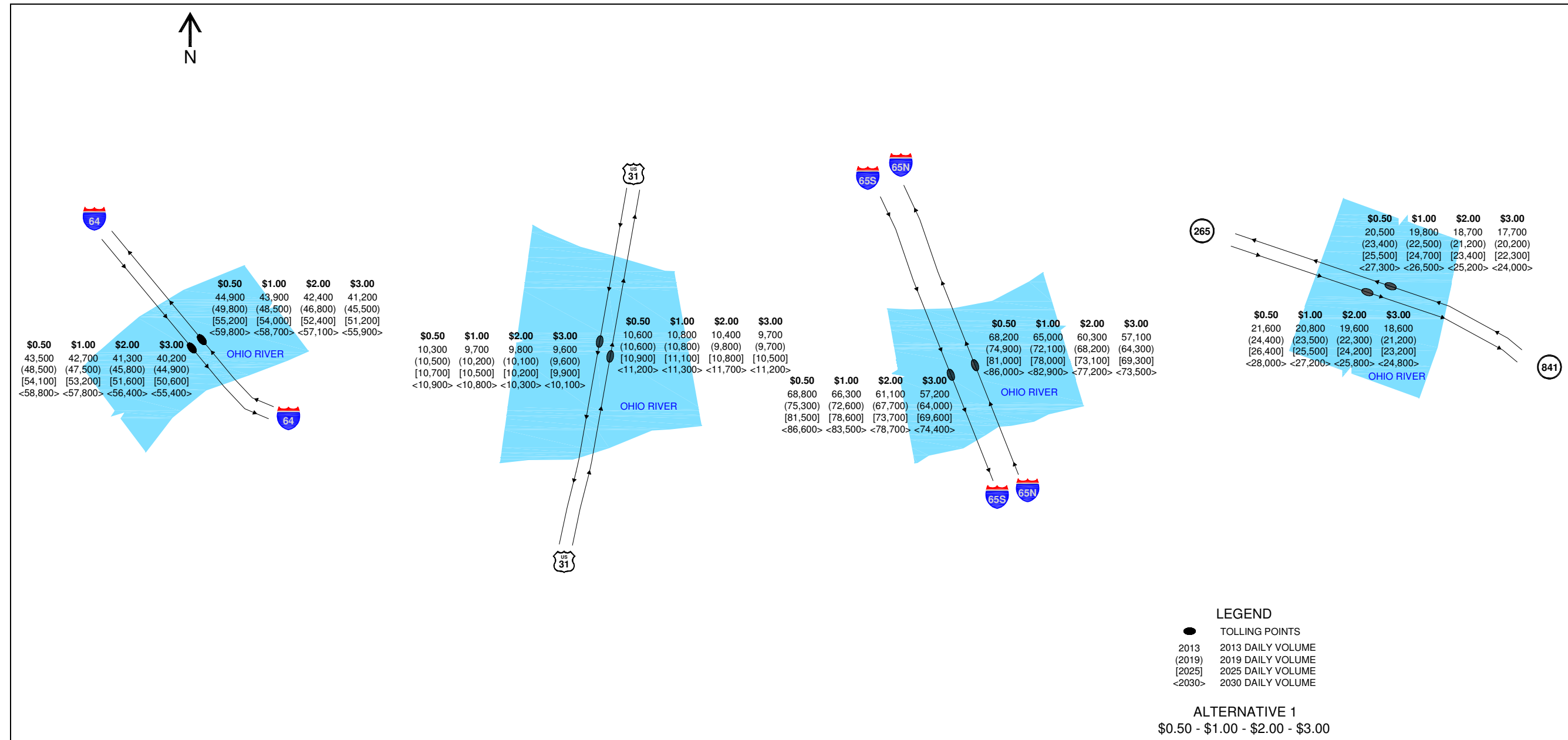


Figure 5.9 Daily Traffic Forecasts for Alternative 1
(Alternative 1: Toll all four bridges (I-64, US 31, I-65 and East-End bridges))

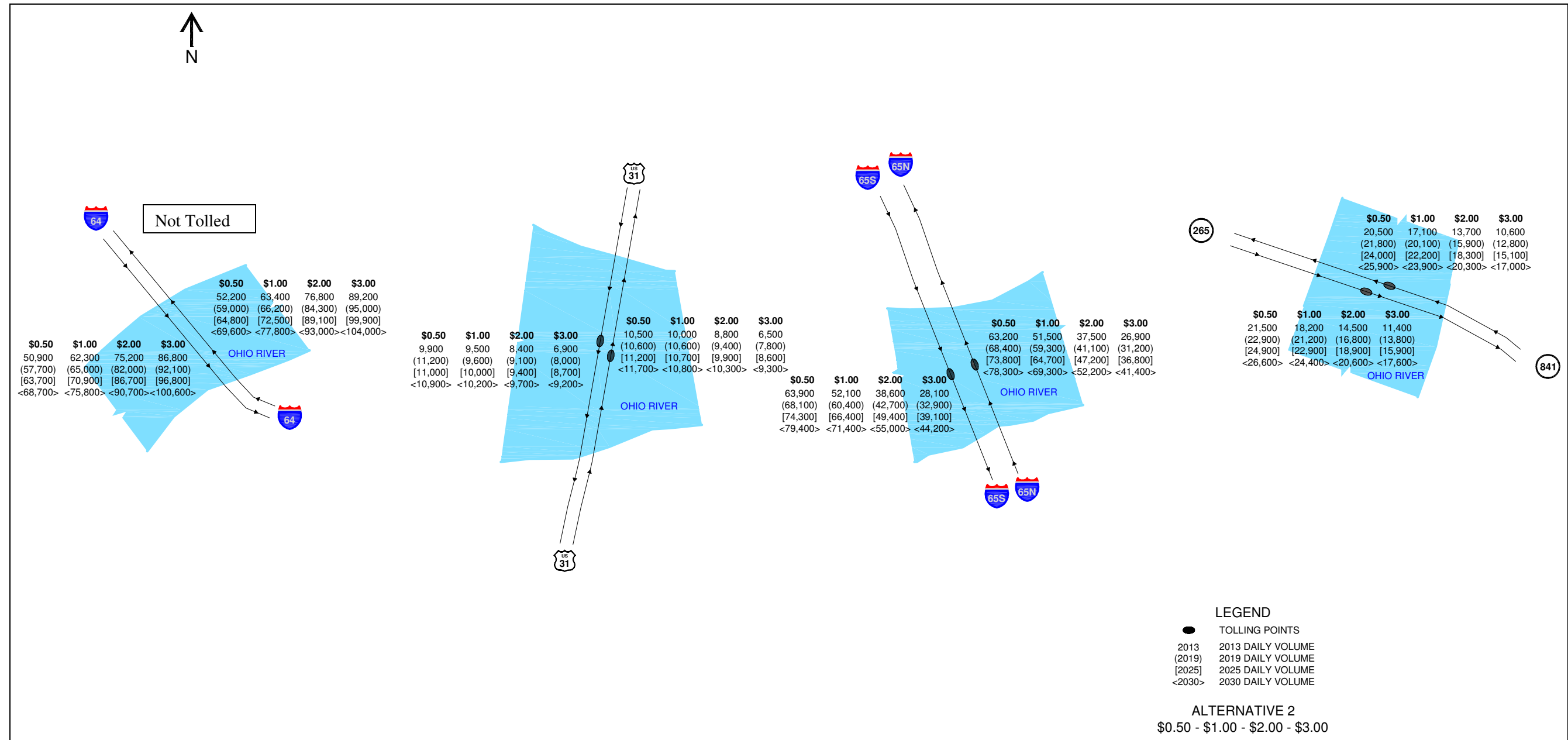


Figure 5.10 Daily Traffic Forecasts for Alternative 2
(Alternative 2: Toll US 31, I-65 and East-End bridges)

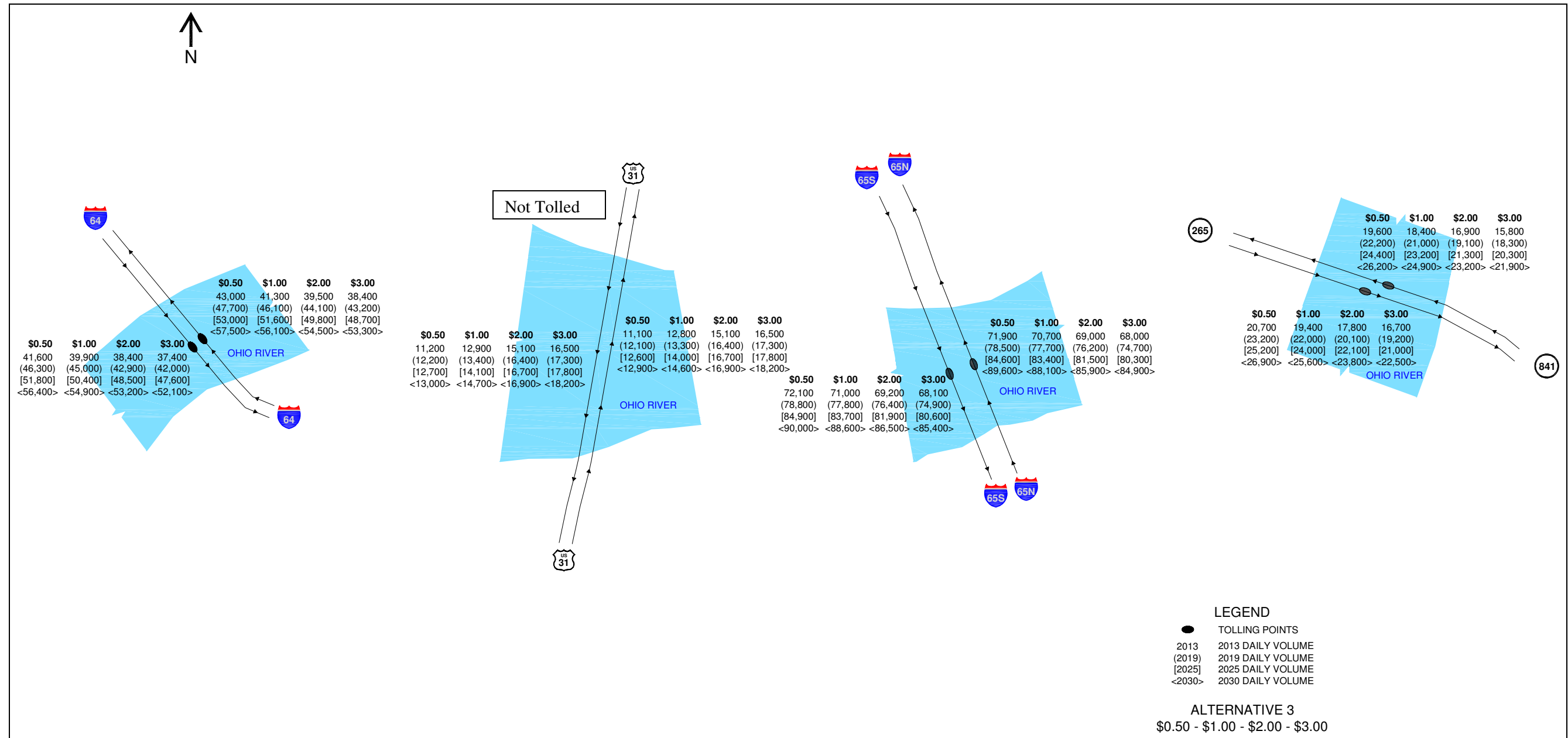


Figure 5.11 Daily Traffic Forecasts for Alternative 3
(Alternative 3: Toll I-64, I-65 and East-End bridges)

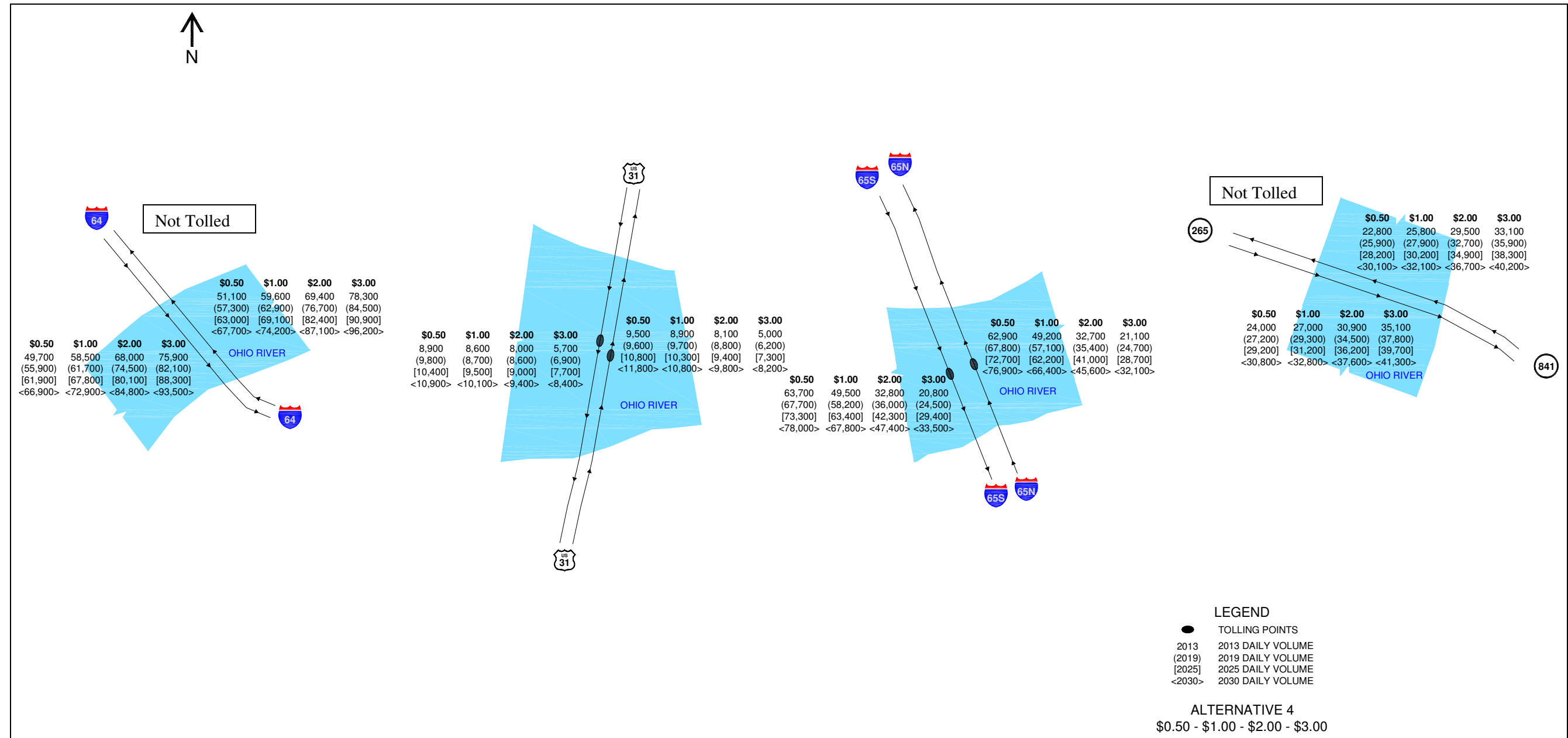


Figure 5.12 Daily Traffic Forecasts for Alternative 4
(Alternative 4: Toll US 31 and I-65 bridges)

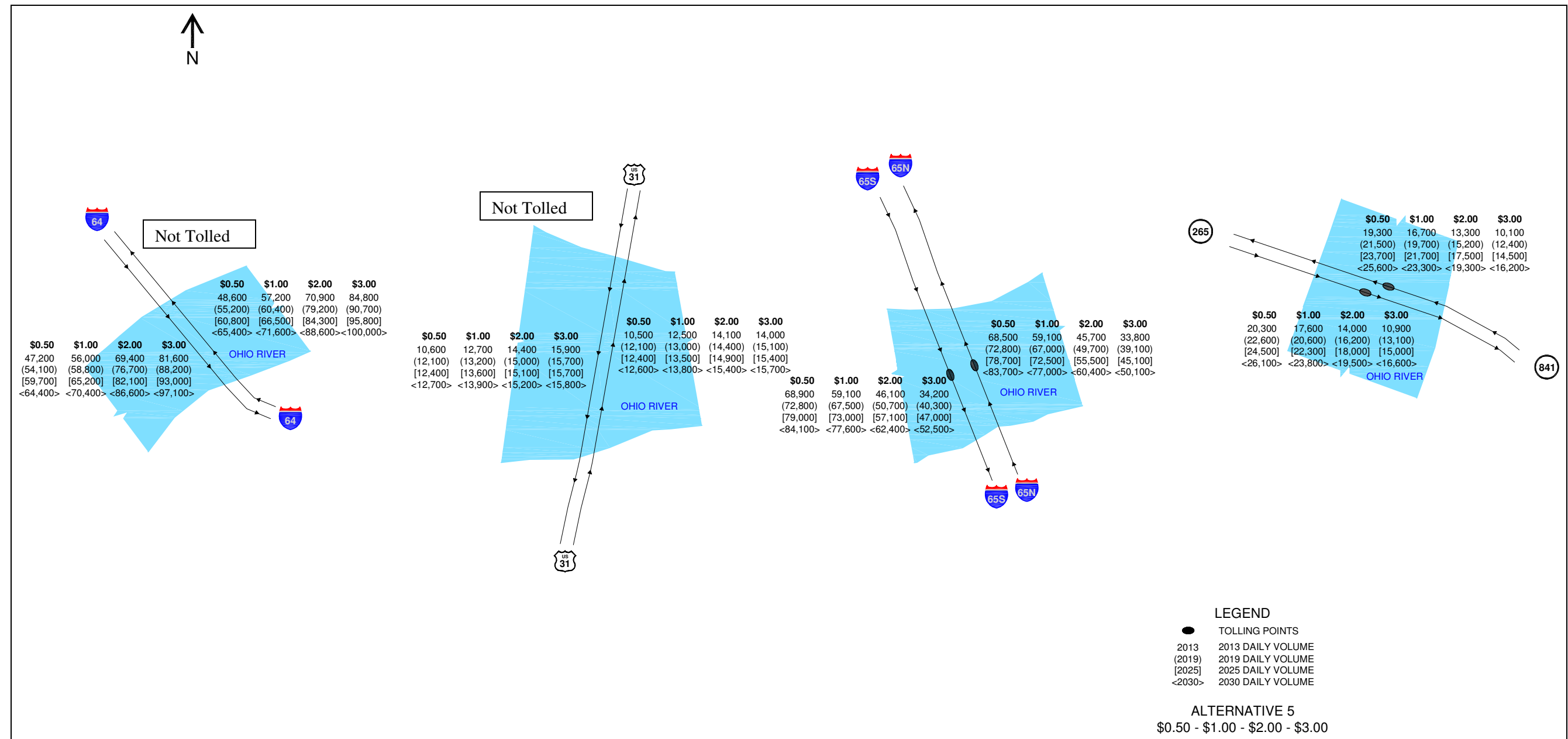


Figure 5.13 Daily Traffic Forecasts for Alternative 5
(Alternative 5: Toll I-65 and East-End bridges)

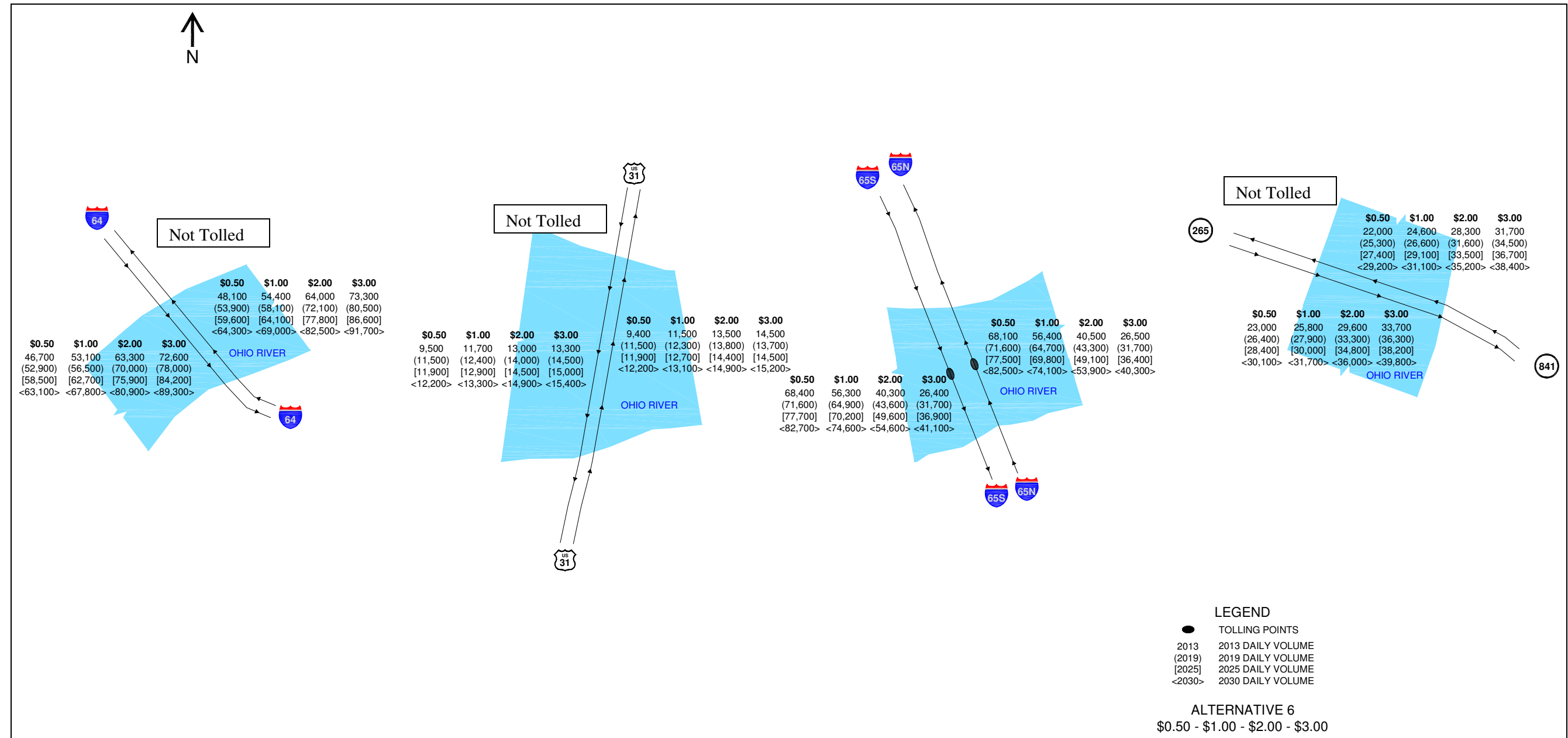


Figure 5.14 Daily Traffic Forecasts for Alternative 6
(Alternative 6: Toll I-65 bridge)

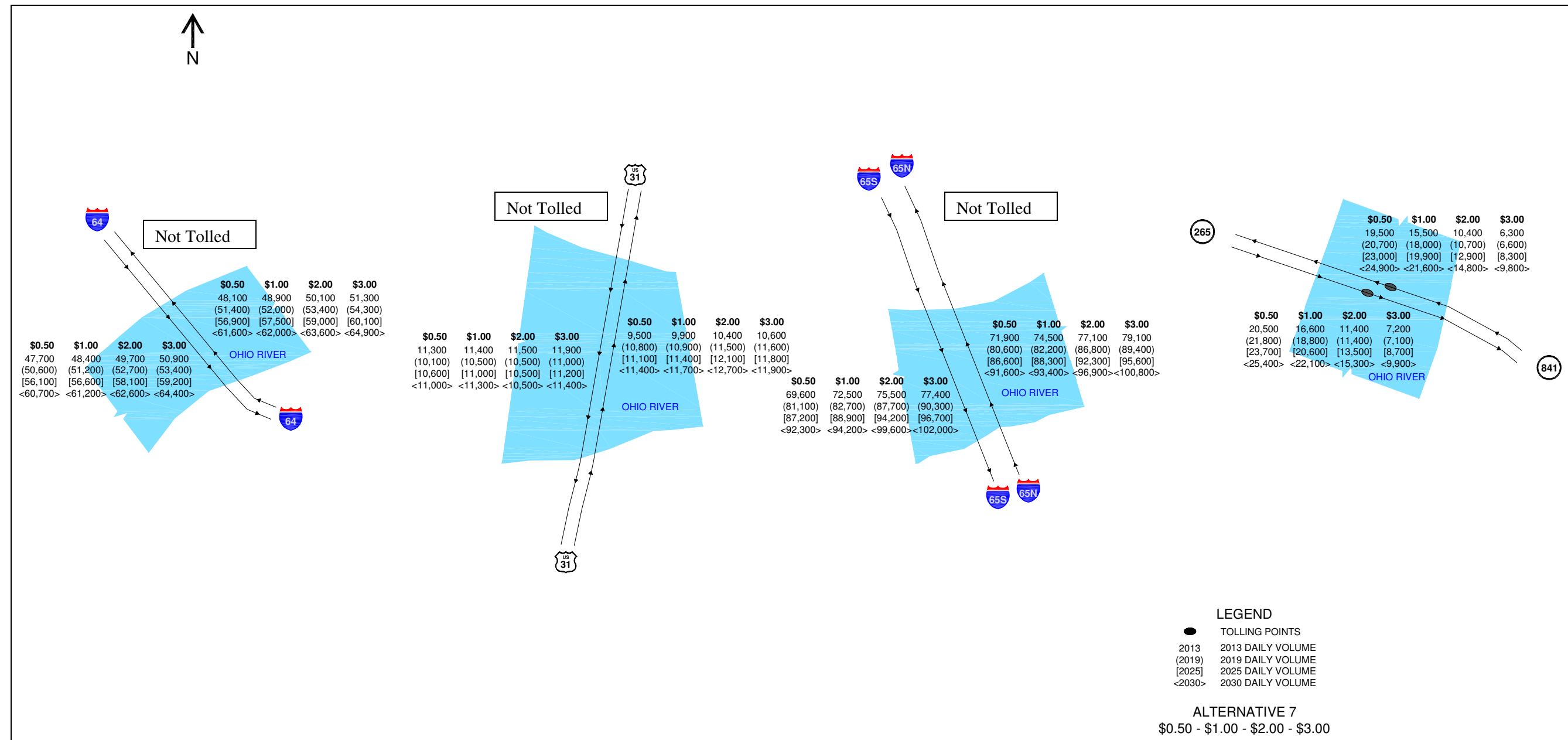


Figure 5.15 Daily Traffic Forecasts for Alternative 7
(Alternative 7: Toll East-End bridge)

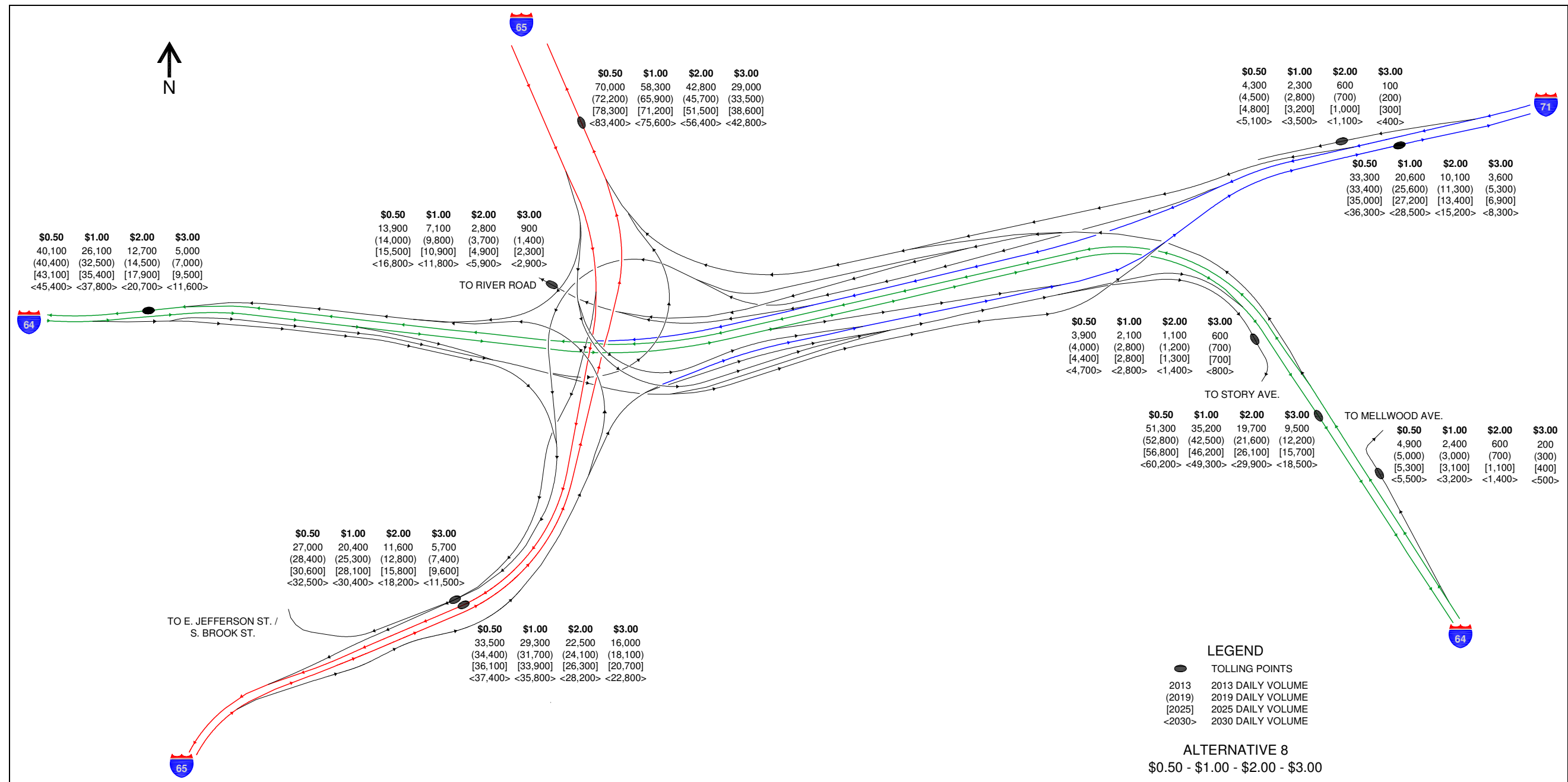


Figure 5.16 Daily Traffic Forecasts for Alternative 8
(Alternative 8: Toll the Kennedy Interchange)



5.4.3 TOLL TRANSACTION FORECASTS

Annual toll transactions were estimated based on the travel demand runs and their assignment results presented in the previous section. **Tables 5.7** and **5.8** present annual toll transactions, by alternative, forecasted for the 30-year projection period beginning in the opening year of 2013. As mentioned in the previous section, forecasts for all alternatives were prepared for the same projection period for comparison purposes. To derive the transactions, the ramp-up period was not assumed.

Table 5.7 indicates that annual toll transactions for Alternative 1 with \$2.00 toll are forecasted to increase from approximately 92 million in 2013 to about 133 million in 2043. The transactions for Alternative 3 for the same period, with a \$2.00 toll, are slightly less than those for Alternative 1, but they show similar growth, about 87 million in 2013 and 127 million in 2043. **Table 5.8** shows that Alternative 7 would generate the lowest transactions, about 8 million in the opening year and approximately 13 million in 2043 with a \$2.00 toll.

Figure 5.17 presents the comparison of toll transactions by alternative for year 2030. Alternatives 1 and 3 would result in the highest toll transactions for all toll rates tested. On the other hand, Alternative 7 would record the lowest transactions among toll alternatives. Alternative 8 shows the third highest transactions for the toll rates, ranging from \$0.50 to \$3.00. This alternative demonstrates the highest sensitivity in transactions to the toll rates tested. Transactions for the \$3.00 toll would drop to approximately 42 million, about 36 percent of the transactions for the \$0.50 toll.

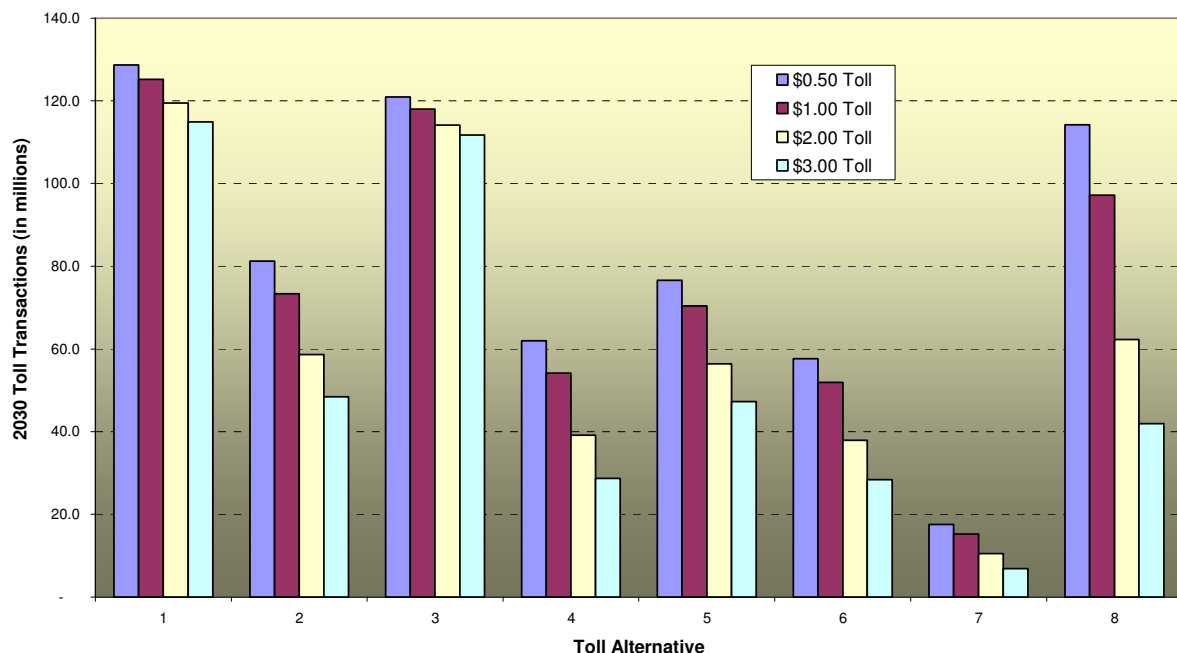


Figure 5.17 Comparison of Toll Transactions by Alternative (2030)



Table 5.7 Annual Toll Transaction Forecasts for Alternatives 1 through 4 (in millions)

Year	Alternative 1				Alternative 2				Alternative 3				Alternative 4			
	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll
2013	100.7	97.4	92.0	87.7	66.1	55.3	42.4	31.5	93.9	91.0	87.5	85.3	50.6	40.5	28.5	18.3
2014	102.3	99.0	93.6	89.3	66.9	56.6	43.2	32.5	95.5	92.7	89.1	86.9	51.2	41.6	28.9	18.9
2015	104.0	100.7	95.3	91.0	67.7	57.9	44.0	33.4	97.1	94.3	90.8	88.5	51.8	42.6	29.3	19.5
2016	105.7	102.4	96.9	92.6	68.5	59.2	44.7	34.3	98.7	96.0	92.4	90.2	52.3	43.6	29.7	20.0
2017	107.4	104.0	98.6	94.3	69.2	60.5	45.5	35.3	100.3	97.7	94.0	91.8	52.9	44.6	30.2	20.6
2018	109.0	105.7	100.2	95.9	70.0	61.9	46.3	36.2	101.9	99.4	95.6	93.4	53.5	45.6	30.6	21.1
2019	110.7	107.4	101.8	97.5	70.8	63.2	47.1	37.2	103.5	101.1	97.3	95.0	54.0	46.6	31.0	21.7
2020	112.4	109.0	103.4	99.1	71.7	64.1	48.1	38.2	105.1	102.6	98.8	96.6	54.8	47.3	31.7	22.3
2021	114.0	110.6	105.0	100.7	72.7	65.0	49.2	39.2	106.7	104.2	100.3	98.1	55.5	48.0	32.5	23.0
2022	115.6	112.2	106.6	102.3	73.6	65.9	50.2	40.2	108.3	105.7	101.9	99.6	56.2	48.7	33.2	23.6
2023	117.3	113.9	108.2	103.8	74.6	66.9	51.3	41.3	109.9	107.2	103.4	101.1	56.9	49.4	34.0	24.2
2024	118.9	115.5	109.8	105.4	75.5	67.8	52.3	42.3	111.4	108.8	104.9	102.6	57.6	50.0	34.7	24.9
2025	120.5	117.1	111.4	107.0	76.5	68.7	53.4	43.3	113.0	110.3	106.5	104.1	58.4	50.7	35.4	25.5
2026	122.2	118.7	113.0	108.6	77.5	69.6	54.4	44.3	114.6	111.8	108.0	105.7	59.1	51.4	36.2	26.1
2027	123.8	120.3	114.6	110.2	78.4	70.5	55.5	45.3	116.2	113.4	109.5	107.2	59.8	52.1	36.9	26.8
2028	125.4	121.9	116.2	111.7	79.4	71.5	56.6	46.4	117.8	114.9	111.1	108.7	60.5	52.8	37.7	27.4
2029	127.0	123.6	117.8	113.3	80.3	72.4	57.6	47.4	119.3	116.4	112.6	110.2	61.2	53.5	38.4	28.0
2030	128.7	125.2	119.4	114.9	81.3	73.3	58.7	48.4	120.9	118.0	114.2	111.7	62.0	54.1	39.2	28.7
2031	130.3	126.8	121.1	116.5	82.2	74.2	59.8	49.6	122.5	119.5	115.7	113.3	62.7	54.8	40.0	29.4
2032	131.9	128.4	122.6	118.0	83.1	75.1	60.9	50.7	124.0	121.0	117.2	114.7	63.3	55.5	40.7	30.1
2033	133.4	129.8	124.1	119.5	83.9	75.9	61.9	51.7	125.5	122.4	118.6	116.1	64.0	56.1	41.4	30.7
2034	134.8	131.2	125.4	120.8	84.7	76.7	63.0	52.8	126.9	123.7	119.9	117.4	64.6	56.7	42.1	31.4
2035	136.2	132.5	126.7	122.1	85.5	77.5	63.9	53.8	128.2	125.0	121.1	118.6	65.1	57.2	42.7	32.0
2036	137.4	133.7	127.8	123.3	86.2	78.2	64.9	54.8	129.5	126.1	122.2	119.7	65.7	57.8	43.3	32.5
2037	138.6	134.8	128.9	124.3	86.8	78.8	65.8	55.8	130.6	127.1	123.2	120.7	66.1	58.3	43.8	33.0
2038	139.7	135.8	129.8	125.3	87.4	79.4	66.6	56.7	131.7	128.1	124.1	121.6	66.6	58.7	44.3	33.5
2039	140.7	136.7	130.6	126.1	88.0	80.0	67.4	57.6	132.7	129.0	124.9	122.4	67.0	59.1	44.7	34.0
2040	141.6	137.5	131.4	126.9	88.5	80.5	68.2	58.4	133.6	129.7	125.6	123.1	67.4	59.5	45.1	34.4
2041	142.4	138.2	132.0	127.5	88.9	80.9	68.9	59.2	134.5	130.4	126.2	123.7	67.7	59.8	45.4	34.8
2042	143.1	138.8	132.5	128.0	89.4	81.3	69.5	59.9	135.2	131.0	126.7	124.2	68.0	60.1	45.6	35.1
2043	144.0	139.3	132.8	128.5	89.9	81.7	70.1	60.6	136.0	131.4	127.1	124.6	68.4	60.4	45.8	35.4
Total	3,859.6	3,748.5	3,569.9	3,432.2	2,445.3	2,190.7	1,751.3	1,438.1	3,625.1	3,530.1	3,410.5	3,336.5	1,864.8	1,617.2	1,163.1	847.0



Table 5.8 Annual Toll Transaction Forecasts for Alternatives 5 through 8 (in millions)

Year	Alternative 5				Alternative 6				Alternative 7				Alternative 8			
	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll
2013	61.7	53.2	41.5	31.1	47.6	39.3	28.2	18.5	13.9	11.2	7.6	4.7	98.5	71.1	43.5	24.7
2014	62.5	54.5	42.3	32.0	48.0	40.3	28.6	19.1	14.1	11.5	7.6	4.7	98.9	73.3	44.2	25.6
2015	63.2	55.8	43.0	32.9	48.4	41.3	28.9	19.7	14.2	11.7	7.6	4.7	99.3	75.5	44.9	26.5
2016	64.0	57.1	43.8	33.8	48.8	42.3	29.3	20.3	14.4	12.0	7.7	4.7	99.7	77.7	45.5	27.4
2017	64.7	58.4	44.5	34.7	49.2	43.2	29.6	20.9	14.5	12.3	7.7	4.8	100.1	80.0	46.2	28.3
2018	65.4	59.7	45.2	35.7	49.6	44.2	30.0	21.5	14.7	12.6	7.7	4.8	100.5	82.2	46.9	29.2
2019	66.2	61.0	46.0	36.6	50.0	45.2	30.3	22.1	14.8	12.8	7.7	4.8	100.9	84.4	47.6	30.0
2020	67.1	61.8	46.9	37.6	50.7	45.8	31.0	22.7	15.1	13.0	8.0	5.0	102.1	85.5	48.9	31.1
2021	68.1	62.7	47.9	38.5	51.4	46.4	31.7	23.3	15.3	13.3	8.2	5.2	103.3	86.7	50.3	32.2
2022	69.0	63.5	48.8	39.5	52.1	47.0	32.4	23.8	15.6	13.5	8.5	5.3	104.5	87.9	51.6	33.3
2023	70.0	64.4	49.8	40.5	52.8	47.6	33.1	24.4	15.8	13.7	8.7	5.5	105.7	89.0	52.9	34.4
2024	70.9	65.2	50.7	41.4	53.5	48.2	33.8	25.0	16.1	13.9	9.0	5.7	106.9	90.2	54.3	35.4
2025	71.9	66.1	51.7	42.4	54.2	48.8	34.5	25.6	16.3	14.1	9.2	5.9	108.1	91.4	55.6	36.5
2026	72.8	67.0	52.6	43.4	54.9	49.5	35.1	26.1	16.6	14.4	9.5	6.1	109.4	92.5	56.9	37.6
2027	73.8	67.8	53.5	44.3	55.6	50.1	35.8	26.7	16.8	14.6	9.7	6.3	110.6	93.7	58.3	38.7
2028	74.7	68.7	54.5	45.3	56.3	50.7	36.5	27.3	17.0	14.8	10.0	6.5	111.8	94.9	59.6	39.8
2029	75.7	69.5	55.4	46.3	56.9	51.3	37.2	27.8	17.3	15.0	10.2	6.7	113.0	96.0	60.9	40.8
2030	76.6	70.4	56.4	47.3	57.6	51.9	37.9	28.4	17.5	15.2	10.5	6.9	114.2	97.2	62.3	41.9
2031	77.6	71.2	57.4	48.3	58.3	52.5	38.6	29.0	17.8	15.5	10.8	7.1	115.4	98.4	63.7	43.2
2032	78.5	72.0	58.3	49.3	59.0	53.1	39.3	29.6	18.0	15.7	11.0	7.3	116.5	99.5	65.2	44.4
2033	79.3	72.8	59.2	50.3	59.6	53.6	39.9	30.2	18.3	15.9	11.3	7.5	117.5	100.5	66.6	45.6
2034	80.1	73.5	60.0	51.2	60.2	54.1	40.5	30.7	18.5	16.1	11.6	7.7	118.5	101.5	67.9	46.8
2035	80.9	74.1	60.7	52.1	60.8	54.5	41.1	31.2	18.7	16.3	11.8	7.9	119.4	102.4	69.3	48.0
2036	81.6	74.8	61.4	52.9	61.3	54.9	41.5	31.6	18.9	16.4	12.0	8.1	120.2	103.3	70.5	49.2
2037	82.3	75.3	62.0	53.7	61.8	55.3	41.9	32.0	19.1	16.6	12.2	8.3	121.0	104.1	71.7	50.3
2038	82.9	75.8	62.5	54.3	62.2	55.7	42.3	32.3	19.2	16.8	12.4	8.5	121.6	104.8	72.9	51.4
2039	83.5	76.2	62.9	55.0	62.7	55.9	42.6	32.6	19.4	16.9	12.6	8.7	122.2	105.5	74.0	52.5
2040	84.0	76.6	63.2	55.5	63.0	56.2	42.8	32.9	19.5	17.0	12.8	8.8	122.7	106.1	74.9	53.5
2041	84.5	76.9	63.4	56.0	63.4	56.4	42.9	33.1	19.7	17.1	12.9	9.0	123.3	106.6	75.8	54.5
2042	85.0	77.2	63.6	56.4	63.7	56.6	43.0	33.2	19.8	17.2	13.1	9.1	123.9	107.1	76.7	55.4
2043	85.4	77.4	63.7	56.7	64.1	56.7	43.1	33.3	19.9	17.3	13.2	9.2	124.6	107.5	77.4	56.3
Total	2,303.9	2,100.6	1,672.7	1,394.9	1,737.6	1,548.5	1,123.4	835.0	526.7	454.4	312.7	205.8	3,454.2	2,896.6	1,857.0	1,244.1



5.4.4 TOLL GROSS REVENUE FORECASTS

Annual toll gross revenues were estimated based on the transaction forecasts and the toll rates applied. **Tables 5.9** and **5.10** present annual toll gross revenues in nominal dollars by alternative forecasted for the 30-year projection period beginning in the opening year of 2013.

Table 5.9 indicates that annual toll gross revenues for Alternative 1 with a \$2.00 toll are forecasted to increase from approximately \$271 million in 2013 to about \$826 million in 2043. The gross revenues for Alternative 3 for the same period with the same toll are slightly less than those for Alternative 1, but they show similar growth, about \$258 million in 2013 and \$790 million in 2043. **Table 5.10** shows that Alternative 7 would generate the lowest revenues, about \$22 million in the opening year and approximately \$82 million in 2043 with a \$2.00 toll.

Figure 5.18 presents the comparison of toll gross revenues by alternative for year 2030. Alternatives 1 and 3 would result in the highest toll revenues for all toll rates tested. On the other hand, Alternative 7 would record the lowest revenues among toll alternatives. Alternatives 2 and 5 show similar revenues for all toll rates tested.

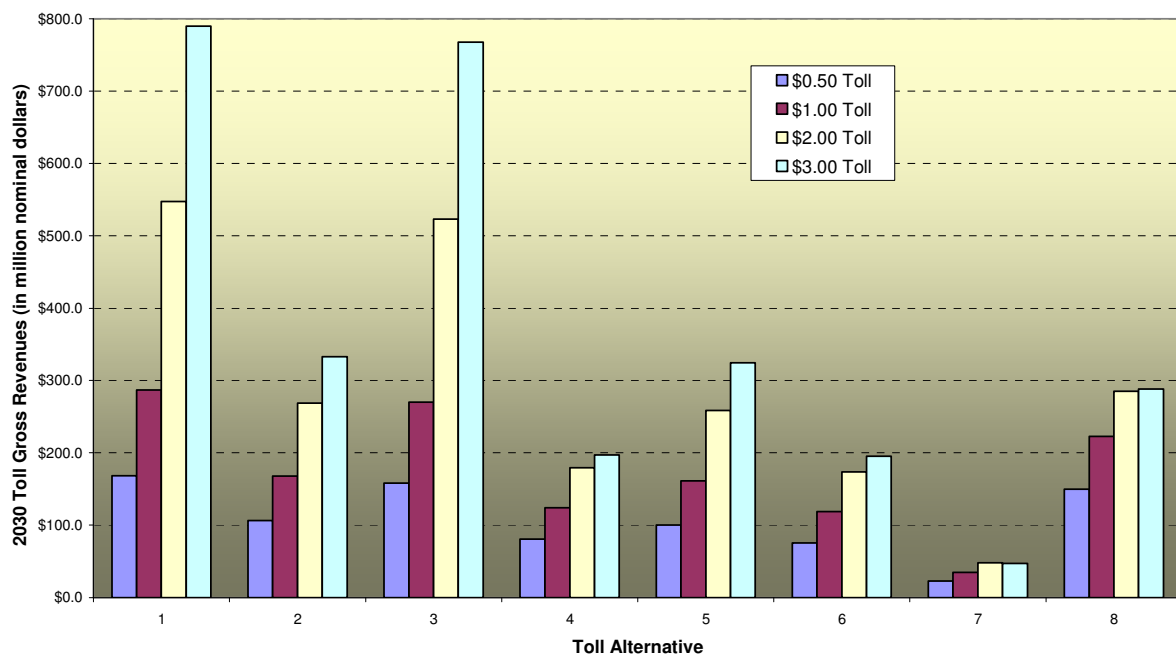


Figure 5.18 Comparison of Toll Gross Revenues by Alternative (2030)



Table 5.9 Annual Toll Gross Revenue Forecasts for Alternatives 1 through 4 (in million nominal dollars)

Year	Alternative 1				Alternative 2				Alternative 3				Alternative 4			
	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll
2013	\$65.9	\$159.3	\$271.0	\$401.8	\$43.3	\$90.4	\$124.9	\$144.5	\$61.4	\$148.9	\$257.8	\$390.7	\$33.1	\$66.3	\$83.9	\$84.0
2014	\$67.0	\$162.1	\$306.4	\$409.3	\$43.8	\$92.6	\$141.3	\$148.8	\$62.5	\$151.6	\$291.7	\$398.2	\$33.5	\$68.0	\$94.6	\$86.6
2015	\$68.1	\$164.8	\$311.8	\$446.6	\$44.3	\$94.7	\$143.8	\$164.0	\$63.5	\$154.4	\$297.0	\$434.6	\$33.9	\$69.7	\$95.9	\$95.6
2016	\$69.2	\$167.5	\$317.2	\$454.6	\$44.8	\$96.9	\$146.4	\$168.6	\$64.6	\$157.1	\$302.3	\$442.6	\$34.2	\$71.3	\$97.3	\$98.3
2017	\$105.4	\$170.2	\$322.5	\$462.7	\$68.0	\$99.1	\$149.0	\$173.2	\$98.5	\$159.9	\$307.6	\$450.6	\$51.9	\$73.0	\$98.7	\$101.0
2018	\$107.1	\$173.0	\$327.9	\$502.1	\$68.7	\$101.2	\$151.5	\$189.6	\$100.1	\$162.7	\$313.0	\$489.1	\$52.5	\$74.7	\$100.1	\$110.7
2019	\$108.7	\$175.7	\$366.6	\$510.7	\$69.5	\$103.4	\$169.5	\$194.5	\$101.6	\$165.4	\$350.1	\$497.6	\$53.1	\$76.3	\$111.6	\$113.7
2020	\$110.3	\$214.0	\$372.4	\$551.4	\$70.4	\$125.9	\$173.3	\$212.4	\$103.2	\$201.5	\$355.6	\$537.2	\$53.8	\$92.9	\$114.3	\$124.3
2021	\$111.9	\$217.2	\$378.1	\$560.2	\$71.4	\$127.7	\$177.1	\$218.1	\$104.7	\$204.5	\$361.2	\$545.6	\$54.5	\$94.3	\$116.9	\$127.8
2022	\$113.5	\$220.4	\$418.8	\$568.9	\$72.3	\$129.5	\$197.3	\$223.8	\$106.3	\$207.6	\$400.0	\$554.0	\$55.2	\$95.6	\$130.5	\$131.3
2023	\$115.1	\$223.5	\$425.1	\$611.7	\$73.2	\$131.3	\$201.4	\$243.0	\$107.8	\$210.6	\$406.1	\$595.6	\$55.9	\$96.9	\$133.4	\$142.8
2024	\$116.7	\$226.7	\$431.4	\$621.0	\$74.2	\$133.1	\$205.5	\$249.0	\$109.4	\$213.6	\$412.1	\$604.5	\$56.6	\$98.3	\$136.3	\$146.5
2025	\$118.3	\$229.9	\$437.6	\$665.3	\$75.1	\$134.9	\$209.7	\$269.2	\$111.0	\$216.6	\$418.1	\$647.5	\$57.3	\$99.6	\$139.2	\$158.6
2026	\$119.9	\$233.1	\$480.9	\$675.2	\$76.0	\$136.7	\$231.6	\$275.6	\$112.5	\$219.6	\$459.5	\$656.9	\$58.0	\$100.9	\$154.0	\$162.6
2027	\$121.5	\$275.6	\$487.7	\$721.0	\$77.0	\$161.6	\$236.1	\$296.8	\$114.1	\$259.7	\$466.0	\$701.4	\$58.7	\$119.3	\$157.1	\$175.3
2028	\$123.1	\$279.4	\$494.5	\$731.4	\$77.9	\$163.7	\$240.6	\$303.5	\$115.6	\$263.2	\$472.6	\$711.3	\$59.4	\$120.9	\$160.3	\$179.4
2029	\$124.7	\$283.1	\$539.9	\$778.8	\$78.8	\$165.8	\$263.9	\$325.7	\$117.2	\$266.8	\$516.0	\$757.3	\$60.1	\$122.4	\$176.0	\$192.7
2030	\$168.4	\$286.8	\$547.2	\$789.7	\$106.4	\$167.9	\$268.7	\$332.8	\$158.3	\$270.3	\$523.0	\$767.7	\$81.1	\$124.0	\$179.4	\$197.1
2031	\$170.6	\$290.5	\$554.7	\$838.8	\$107.6	\$170.0	\$273.9	\$356.8	\$160.4	\$273.8	\$530.2	\$815.4	\$82.0	\$125.6	\$183.1	\$211.6
2032	\$172.6	\$294.1	\$601.9	\$849.8	\$108.8	\$172.0	\$298.8	\$364.8	\$162.4	\$277.2	\$575.3	\$825.9	\$82.9	\$127.1	\$199.9	\$216.5
2033	\$174.6	\$339.9	\$609.0	\$899.3	\$109.9	\$198.8	\$304.0	\$389.5	\$164.3	\$320.5	\$582.1	\$873.8	\$83.8	\$146.9	\$203.4	\$231.3
2034	\$176.5	\$343.6	\$656.6	\$909.5	\$110.9	\$200.9	\$329.7	\$397.4	\$166.1	\$323.9	\$627.7	\$883.5	\$84.5	\$148.4	\$220.5	\$236.0
2035	\$178.2	\$346.9	\$663.2	\$958.9	\$111.9	\$202.8	\$334.8	\$422.7	\$167.8	\$327.1	\$634.1	\$931.3	\$85.3	\$149.9	\$223.8	\$251.0
2036	\$179.9	\$350.1	\$669.2	\$1,008.4	\$112.8	\$204.7	\$339.7	\$448.4	\$169.5	\$330.1	\$639.9	\$979.2	\$86.0	\$151.2	\$226.8	\$266.1
2037	\$181.4	\$353.0	\$716.9	\$1,017.1	\$113.6	\$206.4	\$365.9	\$456.2	\$171.0	\$332.9	\$685.5	\$987.4	\$86.6	\$152.5	\$243.9	\$270.4
2038	\$182.8	\$400.1	\$722.1	\$1,065.9	\$114.4	\$234.0	\$370.6	\$482.3	\$172.4	\$377.3	\$690.6	\$1,034.6	\$87.2	\$172.9	\$246.5	\$285.4
2039	\$184.1	\$402.7	\$769.5	\$1,073.2	\$115.1	\$235.6	\$397.2	\$489.7	\$173.7	\$379.8	\$735.9	\$1,041.4	\$87.7	\$174.1	\$263.4	\$289.2
2040	\$231.7	\$405.1	\$773.8	\$1,121.1	\$144.8	\$237.1	\$401.6	\$515.8	\$218.7	\$382.1	\$740.0	\$1,087.7	\$110.2	\$175.2	\$265.5	\$304.0
2041	\$233.0	\$407.1	\$820.5	\$1,168.5	\$145.5	\$238.4	\$428.2	\$542.1	\$220.0	\$384.1	\$784.8	\$1,133.4	\$110.8	\$176.2	\$282.1	\$318.6
2042	\$234.2	\$408.9	\$823.6	\$1,173.3	\$146.3	\$239.6	\$432.2	\$548.8	\$221.3	\$385.7	\$787.8	\$1,137.8	\$111.3	\$177.1	\$283.5	\$321.6
2043	\$235.6	\$455.9	\$825.9	\$1,219.1	\$147.1	\$267.3	\$435.8	\$574.9	\$222.5	\$430.1	\$790.0	\$1,182.0	\$111.9	\$197.6	\$284.5	\$335.7
Total	\$4,470.1	\$8,660.2	\$16,444.0	\$23,765.2	\$2,823.9	\$5,063.9	\$8,144.0	\$10,122.7	\$4,202.3	\$8,158.6	\$15,713.3	\$23,095.8	\$2,152.9	\$3,739.2	\$5,406.2	\$5,965.6



Table 5.10 Annual Toll Gross Revenue Forecasts for Alternatives 5 through 8 (in million nominal dollars)

Year	Alternative 5				Alternative 6				Alternative 7				Alternative 8			
	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll
2013	\$40.4	\$87.1	\$122.4	\$142.3	\$31.2	\$64.3	\$83.1	\$84.6	\$9.1	\$18.3	\$22.5	\$21.6	\$64.5	\$116.3	\$128.1	\$113.0
2014	\$40.9	\$89.2	\$138.4	\$146.5	\$31.4	\$65.9	\$93.5	\$87.4	\$9.2	\$18.8	\$25.0	\$21.7	\$64.7	\$120.0	\$144.5	\$117.1
2015	\$41.4	\$91.3	\$140.8	\$161.5	\$31.7	\$67.5	\$94.6	\$96.6	\$9.3	\$19.2	\$25.0	\$23.3	\$65.0	\$123.6	\$146.8	\$129.9
2016	\$41.9	\$93.4	\$143.2	\$166.0	\$31.9	\$69.1	\$95.8	\$99.6	\$9.4	\$19.7	\$25.1	\$23.3	\$65.2	\$127.2	\$149.0	\$134.3
2017	\$63.5	\$95.5	\$145.6	\$170.5	\$48.3	\$70.7	\$97.0	\$102.6	\$14.3	\$20.1	\$25.1	\$23.3	\$98.3	\$130.8	\$151.3	\$138.7
2018	\$64.2	\$97.7	\$148.0	\$186.7	\$48.7	\$72.4	\$98.1	\$112.7	\$14.4	\$20.5	\$25.2	\$25.0	\$98.6	\$134.4	\$153.5	\$152.6
2019	\$65.0	\$99.8	\$165.5	\$191.5	\$49.1	\$74.0	\$109.2	\$115.9	\$14.6	\$21.0	\$27.7	\$25.0	\$99.0	\$138.1	\$171.4	\$157.3
2020	\$65.9	\$121.4	\$168.9	\$208.9	\$49.7	\$89.9	\$111.7	\$126.3	\$14.8	\$25.6	\$28.6	\$27.6	\$100.2	\$168.0	\$176.2	\$173.2
2021	\$66.8	\$123.1	\$172.3	\$214.3	\$50.4	\$91.1	\$114.2	\$129.5	\$15.0	\$26.0	\$29.5	\$28.7	\$101.4	\$170.3	\$181.0	\$179.2
2022	\$67.8	\$124.8	\$191.7	\$219.7	\$51.1	\$92.3	\$127.2	\$132.7	\$15.3	\$26.5	\$33.2	\$29.8	\$102.6	\$172.5	\$202.6	\$185.2
2023	\$68.7	\$126.4	\$195.4	\$238.3	\$51.8	\$93.5	\$129.9	\$143.8	\$15.5	\$26.9	\$34.2	\$32.6	\$103.8	\$174.8	\$207.9	\$202.4
2024	\$69.6	\$128.1	\$199.1	\$244.1	\$52.5	\$94.7	\$132.6	\$147.2	\$15.8	\$27.3	\$35.2	\$33.7	\$105.0	\$177.1	\$213.1	\$208.7
2025	\$70.6	\$129.8	\$202.8	\$263.6	\$53.2	\$95.9	\$135.3	\$158.9	\$16.0	\$27.8	\$36.2	\$36.8	\$106.2	\$179.4	\$218.3	\$227.0
2026	\$71.5	\$131.5	\$223.8	\$269.7	\$53.9	\$97.1	\$149.5	\$162.4	\$16.2	\$28.2	\$40.3	\$38.0	\$107.4	\$181.7	\$242.2	\$233.8
2027	\$72.4	\$155.3	\$227.8	\$290.2	\$54.5	\$114.7	\$152.4	\$174.7	\$16.5	\$33.4	\$41.3	\$41.2	\$108.5	\$214.7	\$247.9	\$253.1
2028	\$73.3	\$157.3	\$231.8	\$296.6	\$55.2	\$116.1	\$155.3	\$178.5	\$16.7	\$33.9	\$42.4	\$42.5	\$109.7	\$217.3	\$253.5	\$260.2
2029	\$74.3	\$159.2	\$254.0	\$318.1	\$55.9	\$117.5	\$170.4	\$191.3	\$17.0	\$34.4	\$46.8	\$45.9	\$110.9	\$220.0	\$279.2	\$280.6
2030	\$100.3	\$161.2	\$258.3	\$324.7	\$75.5	\$118.8	\$173.6	\$195.2	\$23.0	\$34.9	\$48.0	\$47.2	\$149.5	\$222.7	\$285.3	\$288.0
2031	\$101.5	\$163.2	\$262.9	\$347.8	\$76.4	\$120.2	\$176.9	\$209.0	\$23.3	\$35.4	\$49.3	\$51.1	\$151.0	\$225.3	\$292.0	\$310.7
2032	\$102.7	\$165.0	\$286.3	\$355.2	\$77.2	\$121.5	\$193.0	\$213.2	\$23.6	\$35.9	\$54.2	\$52.7	\$152.5	\$227.9	\$319.9	\$319.6
2033	\$103.8	\$190.6	\$290.6	\$378.7	\$78.1	\$140.3	\$196.1	\$227.1	\$23.9	\$41.6	\$55.5	\$56.7	\$153.9	\$263.2	\$326.8	\$343.3
2034	\$104.9	\$192.4	\$314.2	\$385.6	\$78.8	\$141.6	\$212.2	\$231.0	\$24.2	\$42.1	\$60.5	\$58.3	\$155.1	\$265.7	\$355.7	\$352.3
2035	\$105.9	\$194.1	\$318.0	\$409.2	\$79.6	\$142.8	\$215.0	\$244.8	\$24.5	\$42.6	\$61.8	\$62.4	\$156.3	\$268.2	\$362.6	\$377.0
2036	\$106.8	\$195.7	\$321.4	\$432.9	\$80.3	\$143.9	\$217.4	\$258.6	\$24.7	\$43.0	\$63.0	\$66.6	\$157.4	\$270.4	\$369.2	\$402.2
2037	\$107.7	\$197.1	\$344.7	\$439.0	\$80.9	\$144.8	\$233.3	\$261.7	\$24.9	\$43.5	\$68.1	\$68.2	\$158.3	\$272.5	\$399.0	\$411.5
2038	\$108.5	\$223.2	\$347.4	\$462.4	\$81.5	\$163.9	\$235.2	\$275.1	\$25.2	\$49.3	\$69.2	\$72.4	\$159.2	\$308.8	\$405.4	\$437.4
2039	\$109.3	\$224.5	\$370.3	\$467.6	\$82.0	\$164.8	\$250.7	\$277.7	\$25.4	\$49.7	\$74.4	\$73.8	\$159.9	\$310.7	\$435.6	\$446.5
2040	\$137.5	\$225.6	\$372.2	\$490.5	\$103.2	\$165.5	\$251.9	\$290.5	\$31.9	\$50.1	\$75.3	\$78.1	\$200.7	\$312.5	\$441.4	\$472.6
2041	\$138.3	\$226.5	\$394.4	\$513.0	\$103.7	\$166.1	\$266.8	\$303.1	\$32.2	\$50.5	\$80.4	\$82.3	\$201.7	\$314.0	\$471.6	\$499.0
2042	\$139.1	\$227.3	\$395.3	\$516.7	\$104.3	\$166.6	\$267.3	\$304.4	\$32.4	\$50.8	\$81.2	\$83.6	\$202.8	\$315.4	\$476.7	\$507.5
2043	\$139.8	\$253.2	\$395.9	\$538.2	\$104.9	\$185.5	\$267.7	\$316.2	\$32.6	\$56.7	\$81.9	\$87.7	\$203.9	\$351.7	\$481.4	\$533.9
Total	\$2,664.3	\$4,850.5	\$7,743.5	\$9,789.9	\$2,006.7	\$3,573.1	\$5,207.0	\$5,852.5	\$610.8	\$1,053.6	\$1,465.9	\$1,461.2	\$3,973.4	\$6,695.1	\$8,689.2	\$8,847.7



5.4.5 TOLL SYSTEM OPERATIONS AND MAINTENANCE COSTS

The toll system operations and maintenance (O&M) costs were estimated based on the number of tolling points by toll alternative. Broadly, the O&M costs consist of categories of administration, maintenance and customer service operations cost. Administration includes items such as office lease, staff, utilities, communications, vendor field service support, supplies and equipment and furnishings. Maintenance can be further itemized as technicians, test equipment and tools, vehicles, communications and inventory. Customer service operations cost is the cost required for ETC transaction processing.

Table 5.11 lists the preliminary estimates of the O&M costs for these items by toll alternative. It should be noted that the table does not include the costs for customer service operation. These costs were estimated separately by assuming \$0.11 per transaction. As indicated in the table, Alternatives 1, 2, 3 and 8 would require approximately \$825,000 annually (in 2007 dollars) for administration and maintenance in addition to the costs for customer service center operation. On the other hand, Alternatives 4, 5, 6 and 7 would require about \$656,000 annually for administration and maintenance.

Table 5.11 Toll System Annual Administration and Maintenance Costs
(In 2007, thousands dollars)

Cost Category	Item Description	Toll Alternative							
		1	2	3	4	5	6	7	8
Administration	Office Lease	\$63.0	\$63.0	\$63.0	\$63.0	\$63.0	\$63.0	\$63.0	\$63.0
	Staff	\$280.0	\$280.0	\$280.0	\$280.0	\$280.0	\$280.0	\$280.0	\$280.0
	Utilities	\$7.2	\$7.2	\$7.2	\$7.2	\$7.2	\$7.2	\$7.2	\$7.2
	Communications (T1 Service)	\$24.0	\$24.0	\$24.0	\$24.0	\$24.0	\$24.0	\$24.0	\$24.0
	Vendor Field Service Support	\$15.0	\$15.0	\$15.0	\$15.0	\$15.0	\$15.0	\$15.0	\$15.0
	Supplies	\$12.0	\$12.0	\$12.0	\$12.0	\$12.0	\$12.0	\$12.0	\$12.0
	Equipment & Furnishings	\$36.0	\$36.0	\$36.0	\$36.0	\$36.0	\$36.0	\$36.0	\$36.0
Maintenance	Technicians	\$260.0	\$260.0	\$260.0	\$130.0	\$130.0	\$130.0	\$130.0	\$260.0
	Test Equipment & Tools	\$66.0	\$66.0	\$66.0	\$50.0	\$50.0	\$50.0	\$50.0	\$66.0
	Vehicles	\$9.6	\$9.6	\$9.6	\$7.2	\$7.2	\$7.2	\$7.2	\$9.6
	Communications	\$1.8	\$1.8	\$1.8	\$1.2	\$1.2	\$1.2	\$1.2	\$1.8
	Inventory	\$50.0	\$50.0	\$50.0	\$30.0	\$30.0	\$30.0	\$30.0	\$50.0
Total Operations Cost		\$824.6	\$824.6	\$824.6	\$655.6	\$655.6	\$655.6	\$655.6	\$824.6
less Customer Service Center Operations Cost*									

* Customer Service Center Operations Costs were separately estimated by assuming \$0.11 per transaction



Tables 5.12 and 5.13 present annual toll system operations and maintenance costs in nominal dollars by alternative forecasted for the 30-year projection period beginning in the opening year of 2013.

Table 5.12 indicates that annual O&M costs for Alternative 1 with \$2.00 toll are forecasted to increase from approximately \$13 million in 2013 to about \$37 million in 2043. The O&M costs for Alternative 3 for the same period with a \$2.00 toll are slightly less than those for Alternative 1. Table 5.13 shows that Alternative 7 would require the lowest O&M costs, about \$2 million in the opening year and approximately \$5 million in 2043 with a \$2.00 toll.

Figure 5.19 presents the comparison of toll system O&M costs by alternative for year 2030. Alternative 1 would require the highest O&M costs for all toll rates tested. Alternative 8 shows the third highest O&M costs for the toll rates from \$0.50 to \$3.00. On the other hand, Alternative 7 would require the lowest O&M costs among toll alternatives because of the lowest toll transactions. Alternatives 2 and 5 show similar O&M costs for all toll rates tested.

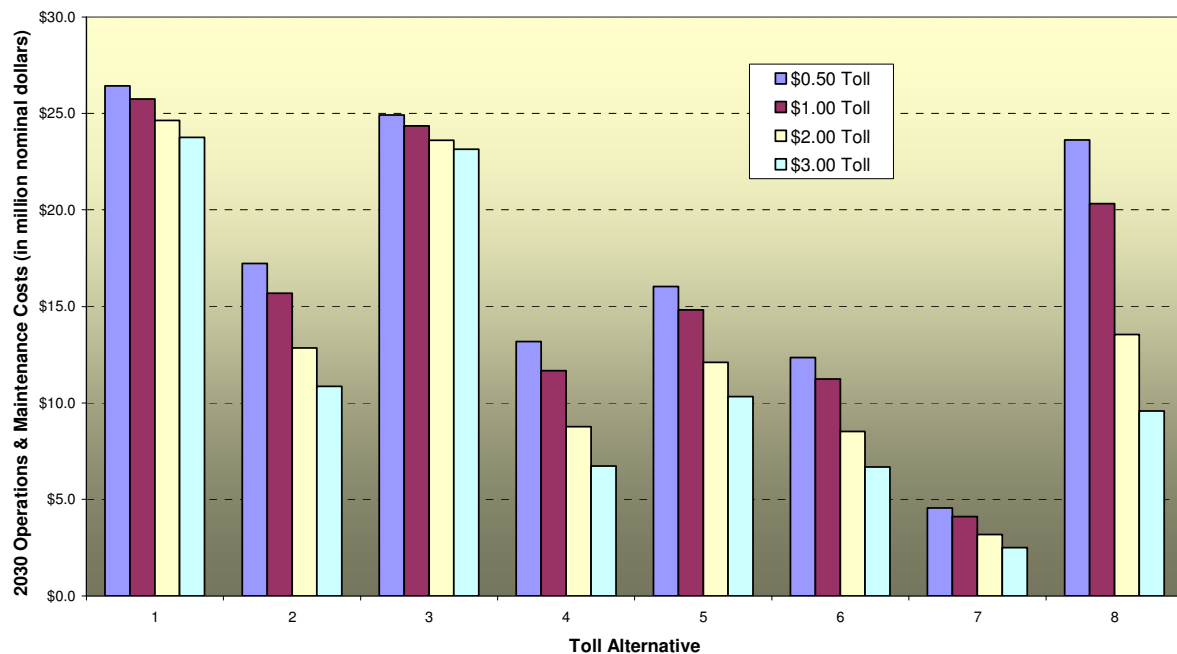


Figure 5.19 Comparison of Toll System Operations and Maintenance Costs by Alternative (2030)



Table 5.12 Annual Toll System Operations and Maintenance Costs for Alternatives 1 through 4 (in million nominal dollars)

Year	Alternative 1				Alternative 2				Alternative 3				Alternative 4			
	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll
2013	\$13.8	\$13.4	\$12.7	\$12.1	\$9.4	\$8.0	\$6.4	\$5.0	\$12.9	\$12.6	\$12.1	\$11.8	\$7.2	\$5.9	\$4.4	\$3.1
2014	\$14.4	\$13.9	\$13.2	\$12.7	\$9.7	\$8.4	\$6.6	\$5.2	\$13.5	\$13.1	\$12.6	\$12.3	\$7.5	\$6.2	\$4.6	\$3.3
2015	\$14.9	\$14.5	\$13.8	\$13.2	\$10.1	\$8.8	\$6.9	\$5.5	\$14.0	\$13.6	\$13.2	\$12.9	\$7.7	\$6.5	\$4.7	\$3.4
2016	\$15.5	\$15.1	\$14.3	\$13.8	\$10.4	\$9.2	\$7.2	\$5.7	\$14.6	\$14.2	\$13.7	\$13.4	\$8.0	\$6.8	\$4.9	\$3.6
2017	\$16.2	\$15.7	\$14.9	\$14.3	\$10.8	\$9.6	\$7.5	\$6.0	\$15.2	\$14.8	\$14.3	\$14.0	\$8.3	\$7.1	\$5.1	\$3.7
2018	\$16.8	\$16.3	\$15.5	\$14.9	\$11.2	\$10.0	\$7.8	\$6.3	\$15.8	\$15.4	\$14.9	\$14.6	\$8.6	\$7.4	\$5.3	\$3.9
2019	\$17.5	\$17.0	\$16.2	\$15.5	\$11.6	\$10.5	\$8.1	\$6.6	\$16.4	\$16.1	\$15.5	\$15.2	\$8.9	\$7.8	\$5.5	\$4.1
2020	\$18.2	\$17.7	\$16.8	\$16.2	\$12.0	\$10.9	\$8.4	\$6.9	\$17.1	\$16.7	\$16.1	\$15.8	\$9.2	\$8.1	\$5.7	\$4.3
2021	\$18.9	\$18.4	\$17.5	\$16.8	\$12.5	\$11.3	\$8.8	\$7.3	\$17.7	\$17.4	\$16.8	\$16.4	\$9.5	\$8.4	\$6.0	\$4.5
2022	\$19.6	\$19.1	\$18.2	\$17.5	\$12.9	\$11.7	\$9.2	\$7.6	\$18.4	\$18.0	\$17.4	\$17.1	\$9.9	\$8.7	\$6.2	\$4.7
2023	\$20.4	\$19.8	\$18.9	\$18.2	\$13.4	\$12.1	\$9.6	\$8.0	\$19.2	\$18.7	\$18.1	\$17.7	\$10.3	\$9.0	\$6.5	\$4.9
2024	\$21.2	\$20.6	\$19.6	\$18.9	\$13.9	\$12.6	\$10.0	\$8.3	\$19.9	\$19.5	\$18.8	\$18.4	\$10.6	\$9.4	\$6.8	\$5.2
2025	\$22.0	\$21.4	\$20.4	\$19.6	\$14.4	\$13.1	\$10.4	\$8.7	\$20.7	\$20.2	\$19.6	\$19.2	\$11.0	\$9.7	\$7.1	\$5.4
2026	\$22.8	\$22.2	\$21.2	\$20.4	\$14.9	\$13.6	\$10.9	\$9.1	\$21.5	\$21.0	\$20.3	\$19.9	\$11.4	\$10.1	\$7.4	\$5.6
2027	\$23.7	\$23.0	\$22.0	\$21.2	\$15.5	\$14.1	\$11.4	\$9.5	\$22.3	\$21.8	\$21.1	\$20.7	\$11.9	\$10.5	\$7.7	\$5.9
2028	\$24.6	\$23.9	\$22.9	\$22.0	\$16.0	\$14.6	\$11.8	\$10.0	\$23.1	\$22.6	\$21.9	\$21.5	\$12.3	\$10.9	\$8.1	\$6.2
2029	\$25.5	\$24.8	\$23.7	\$22.9	\$16.6	\$15.1	\$12.3	\$10.4	\$24.0	\$23.5	\$22.7	\$22.3	\$12.7	\$11.3	\$8.4	\$6.4
2030	\$26.4	\$25.8	\$24.6	\$23.8	\$17.2	\$15.7	\$12.8	\$10.9	\$24.9	\$24.4	\$23.6	\$23.1	\$13.2	\$11.7	\$8.8	\$6.7
2031	\$27.4	\$26.7	\$25.6	\$24.7	\$17.8	\$16.3	\$13.4	\$11.4	\$25.9	\$25.3	\$24.5	\$24.0	\$13.7	\$12.1	\$9.1	\$7.0
2032	\$28.4	\$27.7	\$26.5	\$25.6	\$18.5	\$16.8	\$13.9	\$11.9	\$26.8	\$26.2	\$25.4	\$24.9	\$14.1	\$12.5	\$9.5	\$7.3
2033	\$29.4	\$28.7	\$27.5	\$26.5	\$19.1	\$17.4	\$14.5	\$12.4	\$27.8	\$27.2	\$26.4	\$25.8	\$14.6	\$13.0	\$9.9	\$7.7
2034	\$30.5	\$29.7	\$28.5	\$27.5	\$19.8	\$18.0	\$15.1	\$12.9	\$28.8	\$28.1	\$27.3	\$26.8	\$15.1	\$13.4	\$10.3	\$8.0
2035	\$31.5	\$30.8	\$29.5	\$28.5	\$20.4	\$18.7	\$15.7	\$13.5	\$29.8	\$29.1	\$28.2	\$27.7	\$15.6	\$13.9	\$10.7	\$8.3
2036	\$32.6	\$31.8	\$30.5	\$29.4	\$21.1	\$19.3	\$16.3	\$14.0	\$30.8	\$30.1	\$29.2	\$28.6	\$16.1	\$14.3	\$11.1	\$8.7
2037	\$33.7	\$32.8	\$31.5	\$30.4	\$21.8	\$19.9	\$16.9	\$14.6	\$31.9	\$31.1	\$30.2	\$29.6	\$16.6	\$14.8	\$11.5	\$9.0
2038	\$34.8	\$33.9	\$32.5	\$31.4	\$22.4	\$20.6	\$17.5	\$15.2	\$32.9	\$32.1	\$31.1	\$30.5	\$17.2	\$15.3	\$11.9	\$9.3
2039	\$35.9	\$35.0	\$33.5	\$32.4	\$23.1	\$21.2	\$18.2	\$15.8	\$34.0	\$33.1	\$32.1	\$31.5	\$17.7	\$15.8	\$12.3	\$9.7
2040	\$37.0	\$36.0	\$34.5	\$33.4	\$23.8	\$21.9	\$18.8	\$16.4	\$35.1	\$34.1	\$33.1	\$32.4	\$18.2	\$16.3	\$12.7	\$10.0
2041	\$38.2	\$37.1	\$35.5	\$34.4	\$24.6	\$22.5	\$19.4	\$17.0	\$36.2	\$35.1	\$34.1	\$33.4	\$18.8	\$16.8	\$13.1	\$10.4
2042	\$39.3	\$38.2	\$36.5	\$35.4	\$25.3	\$23.2	\$20.1	\$17.6	\$37.3	\$36.1	\$35.0	\$34.4	\$19.3	\$17.3	\$13.5	\$10.7
2043	\$40.5	\$39.3	\$37.5	\$36.4	\$26.1	\$23.9	\$20.8	\$18.2	\$38.4	\$37.2	\$36.0	\$35.3	\$19.9	\$17.8	\$13.8	\$11.1
Total	\$791.7	\$770.3	\$736.1	\$710.0	\$516.5	\$468.7	\$386.7	\$327.7	\$746.8	\$728.2	\$705.4	\$691.2	\$395.2	\$348.6	\$262.5	\$202.2



Table 5.13 Annual Toll System Operations and Maintenance Costs for Alternatives 5 through 8 (in million nominal dollars)

Year	Alternative 5				Alternative 6				Alternative 7				Alternative 8			
	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll
2013	\$8.6	\$7.6	\$6.1	\$4.7	\$6.8	\$5.8	\$4.4	\$3.1	\$2.5	\$2.2	\$1.7	\$1.4	\$13.5	\$10.0	\$6.5	\$4.1
2014	\$8.9	\$7.9	\$6.3	\$5.0	\$7.1	\$6.0	\$4.5	\$3.3	\$2.6	\$2.3	\$1.8	\$1.4	\$13.9	\$10.6	\$6.8	\$4.3
2015	\$9.3	\$8.3	\$6.6	\$5.2	\$7.3	\$6.3	\$4.7	\$3.4	\$2.7	\$2.4	\$1.8	\$1.4	\$14.3	\$11.1	\$7.0	\$4.6
2016	\$9.6	\$8.7	\$6.8	\$5.5	\$7.5	\$6.6	\$4.8	\$3.6	\$2.8	\$2.5	\$1.9	\$1.5	\$14.7	\$11.7	\$7.3	\$4.8
2017	\$9.9	\$9.1	\$7.1	\$5.7	\$7.8	\$6.9	\$5.0	\$3.8	\$2.9	\$2.6	\$1.9	\$1.5	\$15.1	\$12.3	\$7.6	\$5.0
2018	\$10.3	\$9.5	\$7.4	\$6.0	\$8.0	\$7.2	\$5.2	\$4.0	\$3.0	\$2.7	\$2.0	\$1.5	\$15.6	\$12.9	\$7.9	\$5.3
2019	\$10.7	\$9.9	\$7.7	\$6.3	\$8.3	\$7.6	\$5.4	\$4.2	\$3.1	\$2.8	\$2.0	\$1.6	\$16.0	\$13.6	\$8.2	\$5.6
2020	\$11.1	\$10.3	\$8.0	\$6.6	\$8.6	\$7.8	\$5.6	\$4.3	\$3.2	\$2.9	\$2.1	\$1.7	\$16.6	\$14.1	\$8.6	\$5.9
2021	\$11.5	\$10.7	\$8.4	\$6.9	\$8.9	\$8.1	\$5.9	\$4.5	\$3.3	\$3.0	\$2.2	\$1.7	\$17.2	\$14.6	\$9.0	\$6.2
2022	\$11.9	\$11.1	\$8.7	\$7.2	\$9.2	\$8.4	\$6.1	\$4.7	\$3.4	\$3.1	\$2.3	\$1.8	\$17.8	\$15.2	\$9.4	\$6.5
2023	\$12.4	\$11.5	\$9.1	\$7.6	\$9.6	\$8.8	\$6.4	\$5.0	\$3.6	\$3.2	\$2.4	\$1.9	\$18.5	\$15.8	\$9.9	\$6.8
2024	\$12.9	\$11.9	\$9.5	\$7.9	\$9.9	\$9.1	\$6.7	\$5.2	\$3.7	\$3.3	\$2.5	\$2.0	\$19.2	\$16.4	\$10.3	\$7.2
2025	\$13.4	\$12.4	\$9.9	\$8.3	\$10.3	\$9.4	\$6.9	\$5.4	\$3.8	\$3.4	\$2.6	\$2.0	\$19.8	\$17.0	\$10.8	\$7.6
2026	\$13.9	\$12.8	\$10.3	\$8.7	\$10.7	\$9.7	\$7.2	\$5.6	\$4.0	\$3.6	\$2.7	\$2.1	\$20.5	\$17.6	\$11.3	\$7.9
2027	\$14.4	\$13.3	\$10.7	\$9.1	\$11.1	\$10.1	\$7.5	\$5.9	\$4.1	\$3.7	\$2.8	\$2.2	\$21.3	\$18.2	\$11.9	\$8.3
2028	\$14.9	\$13.8	\$11.2	\$9.5	\$11.5	\$10.5	\$7.8	\$6.1	\$4.3	\$3.8	\$2.9	\$2.3	\$22.0	\$18.9	\$12.4	\$8.7
2029	\$15.5	\$14.3	\$11.6	\$9.9	\$11.9	\$10.8	\$8.2	\$6.4	\$4.4	\$4.0	\$3.1	\$2.4	\$22.8	\$19.6	\$13.0	\$9.2
2030	\$16.0	\$14.8	\$12.1	\$10.3	\$12.3	\$11.2	\$8.5	\$6.7	\$4.6	\$4.1	\$3.2	\$2.5	\$23.6	\$20.3	\$13.5	\$9.6
2031	\$16.6	\$15.4	\$12.6	\$10.8	\$12.8	\$11.6	\$8.9	\$7.0	\$4.7	\$4.3	\$3.3	\$2.6	\$24.4	\$21.1	\$14.2	\$10.1
2032	\$17.2	\$15.9	\$13.1	\$11.3	\$13.2	\$12.0	\$9.2	\$7.3	\$4.9	\$4.4	\$3.5	\$2.7	\$25.3	\$21.8	\$14.8	\$10.6
2033	\$17.8	\$16.5	\$13.6	\$11.8	\$13.7	\$12.4	\$9.6	\$7.6	\$5.1	\$4.6	\$3.6	\$2.8	\$26.1	\$22.6	\$15.5	\$11.1
2034	\$18.4	\$17.0	\$14.1	\$12.3	\$14.2	\$12.9	\$10.0	\$7.9	\$5.2	\$4.7	\$3.8	\$2.9	\$27.0	\$23.4	\$16.2	\$11.6
2035	\$19.1	\$17.6	\$14.6	\$12.8	\$14.7	\$13.3	\$10.3	\$8.2	\$5.4	\$4.9	\$3.9	\$3.1	\$27.9	\$24.1	\$16.9	\$12.2
2036	\$19.7	\$18.2	\$15.2	\$13.3	\$15.1	\$13.7	\$10.7	\$8.5	\$5.6	\$5.0	\$4.0	\$3.2	\$28.7	\$24.9	\$17.6	\$12.8
2037	\$20.4	\$18.7	\$15.7	\$13.8	\$15.6	\$14.1	\$11.0	\$8.8	\$5.8	\$5.2	\$4.2	\$3.3	\$29.6	\$25.7	\$18.3	\$13.3
2038	\$21.0	\$19.3	\$16.2	\$14.3	\$16.1	\$14.6	\$11.4	\$9.1	\$6.0	\$5.4	\$4.4	\$3.4	\$30.5	\$26.6	\$19.0	\$13.9
2039	\$21.7	\$19.9	\$16.7	\$14.8	\$16.6	\$15.0	\$11.8	\$9.4	\$6.1	\$5.5	\$4.5	\$3.5	\$31.4	\$27.4	\$19.7	\$14.5
2040	\$22.4	\$20.5	\$17.2	\$15.3	\$17.1	\$15.4	\$12.1	\$9.7	\$6.3	\$5.7	\$4.7	\$3.7	\$32.3	\$28.2	\$20.5	\$15.2
2041	\$23.0	\$21.1	\$17.7	\$15.8	\$17.7	\$15.9	\$12.4	\$9.9	\$6.5	\$5.9	\$4.8	\$3.8	\$33.3	\$29.1	\$21.2	\$15.8
2042	\$23.7	\$21.7	\$18.2	\$16.3	\$18.2	\$16.3	\$12.8	\$10.2	\$6.7	\$6.1	\$5.0	\$3.9	\$34.3	\$29.9	\$22.0	\$16.4
2043	\$24.5	\$22.3	\$18.6	\$16.8	\$18.7	\$16.8	\$13.1	\$10.5	\$6.9	\$6.2	\$5.1	\$4.1	\$35.4	\$30.8	\$22.7	\$17.1
Total	\$480.7	\$441.8	\$360.9	\$309.4	\$370.8	\$334.6	\$254.1	\$199.0	\$137.2	\$123.4	\$96.7	\$75.9	\$709.1	\$605.5	\$409.7	\$292.0



5.4.6 TOLL NET REVENUE FORECASTS

Annual toll net revenues were estimated by subtracting annual toll collection O&M costs from annual gross revenues. Note that the analysis excludes roadway and bridge maintenance costs. **Tables 5.14** and **5.15** present annual toll net revenues in nominal dollars by alternative forecasted for the 30-year projection period beginning in the opening year of 2013.

Table 5.14 indicates that annual toll net revenues for Alternative 1 with the assumed toll rate of \$2.00 are forecasted to increase from approximately \$258 million in 2013 to about \$788 million in 2043. The net revenues for Alternative 3 for the same period with the same toll rate are slightly less than those for Alternative 1, but they show similar growth, about \$245 million in 2013 and \$754 million in 2043. **Table 5.15** shows that Alternative 7 would generate the lowest revenues, about \$21 million in the opening year and approximately \$77 million in 2043 with a \$2.00 toll.

Figure 5.20 presents the comparison of toll net revenues by alternative for year 2030. Alternatives 1 and 3 would result in the highest net revenues for all toll rates tested. On the other hand, Alternative 7 would record the lowest net revenues among toll alternatives. Alternatives 2 and 5 show similar net revenues for all toll rates tested. Alternative 8 would generate the third highest revenues for the toll rates of \$0.50 to \$2.00.

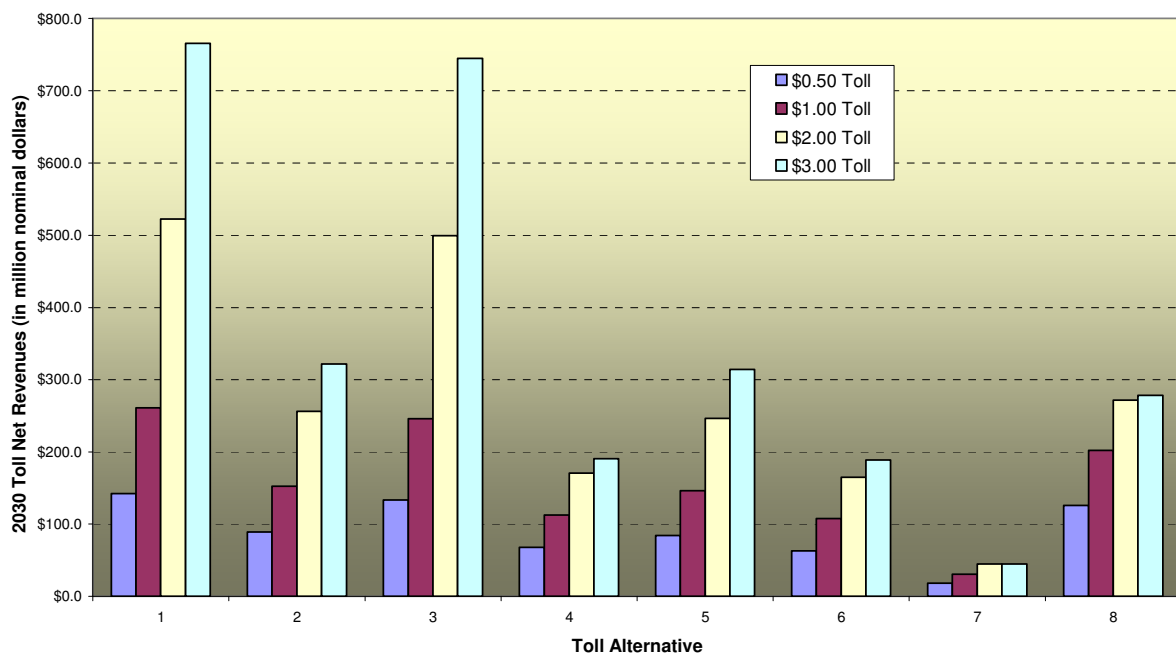


Figure 5.20 Comparison of Toll Net Revenues by Alternative (2030)



Table 5.14 Annual Toll Net Revenues for Alternatives 1 through 4 (in million nominal dollars)

Year	Alternative 1				Alternative 2				Alternative 3				Alternative 4			
	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll
2013	\$52.1	\$146.0	\$258.3	\$389.6	\$33.9	\$82.4	\$118.5	\$139.5	\$48.5	\$136.3	\$245.6	\$378.9	\$25.9	\$60.4	\$79.5	\$80.9
2014	\$52.6	\$148.1	\$293.2	\$396.6	\$34.1	\$84.2	\$134.7	\$143.6	\$49.0	\$138.5	\$279.1	\$385.8	\$26.0	\$61.8	\$90.0	\$83.4
2015	\$53.1	\$150.3	\$298.0	\$433.4	\$34.2	\$86.0	\$136.9	\$158.5	\$49.5	\$140.7	\$283.8	\$421.7	\$26.1	\$63.2	\$91.2	\$92.1
2016	\$53.6	\$152.4	\$302.8	\$440.8	\$34.4	\$87.7	\$139.2	\$162.9	\$50.0	\$142.9	\$288.6	\$429.2	\$26.2	\$64.5	\$92.4	\$94.7
2017	\$89.2	\$154.5	\$307.6	\$448.3	\$57.2	\$89.5	\$141.5	\$167.2	\$83.3	\$145.1	\$293.3	\$436.6	\$43.6	\$65.9	\$93.6	\$97.3
2018	\$90.2	\$156.6	\$312.4	\$487.2	\$57.6	\$91.2	\$143.7	\$183.3	\$84.3	\$147.2	\$298.1	\$474.5	\$43.9	\$67.2	\$94.8	\$106.8
2019	\$91.2	\$158.7	\$350.4	\$495.1	\$57.9	\$92.9	\$161.4	\$187.9	\$85.2	\$149.4	\$334.6	\$482.5	\$44.2	\$68.5	\$106.1	\$109.6
2020	\$92.1	\$196.3	\$355.5	\$535.2	\$58.4	\$115.0	\$164.8	\$205.5	\$86.1	\$184.8	\$339.5	\$521.4	\$44.6	\$84.8	\$108.5	\$120.0
2021	\$93.0	\$198.8	\$360.6	\$543.3	\$58.9	\$116.4	\$168.2	\$210.8	\$87.0	\$187.2	\$344.4	\$529.2	\$44.9	\$85.9	\$111.0	\$123.3
2022	\$93.9	\$201.3	\$400.6	\$551.5	\$59.4	\$117.8	\$188.1	\$216.2	\$87.9	\$189.5	\$382.6	\$537.0	\$45.3	\$86.9	\$124.2	\$126.6
2023	\$94.7	\$203.7	\$406.2	\$593.5	\$59.8	\$119.1	\$191.8	\$235.0	\$88.7	\$191.8	\$387.9	\$577.8	\$45.6	\$87.9	\$126.9	\$137.9
2024	\$95.6	\$206.1	\$411.7	\$602.1	\$60.3	\$120.5	\$195.5	\$240.7	\$89.5	\$194.1	\$393.3	\$586.1	\$45.9	\$88.9	\$129.5	\$141.4
2025	\$96.4	\$208.5	\$417.2	\$645.7	\$60.7	\$121.8	\$199.2	\$260.5	\$90.3	\$196.4	\$398.6	\$628.3	\$46.3	\$89.9	\$132.1	\$153.2
2026	\$97.1	\$210.9	\$459.7	\$654.8	\$61.1	\$123.1	\$220.7	\$266.5	\$91.0	\$198.6	\$439.2	\$637.0	\$46.6	\$90.9	\$146.6	\$156.9
2027	\$97.9	\$252.6	\$465.7	\$699.8	\$61.5	\$147.5	\$224.8	\$287.3	\$91.8	\$237.9	\$444.9	\$680.7	\$46.9	\$108.9	\$149.4	\$169.4
2028	\$98.6	\$255.4	\$471.7	\$709.3	\$61.9	\$149.1	\$228.8	\$293.6	\$92.5	\$240.6	\$450.7	\$689.9	\$47.1	\$110.0	\$152.2	\$173.2
2029	\$99.2	\$258.2	\$516.2	\$755.9	\$62.2	\$150.7	\$251.6	\$315.3	\$93.1	\$243.3	\$493.2	\$735.0	\$47.4	\$111.2	\$167.6	\$186.3
2030	\$142.0	\$261.0	\$522.6	\$765.9	\$89.1	\$152.2	\$255.9	\$321.9	\$133.4	\$245.9	\$499.4	\$744.6	\$67.9	\$112.3	\$170.6	\$190.4
2031	\$143.2	\$263.8	\$529.1	\$814.2	\$89.7	\$153.7	\$260.5	\$345.4	\$134.5	\$248.6	\$505.6	\$791.4	\$68.4	\$113.5	\$173.9	\$204.5
2032	\$144.2	\$266.4	\$575.3	\$824.2	\$90.3	\$155.2	\$284.9	\$352.9	\$135.5	\$251.0	\$549.8	\$801.0	\$68.8	\$114.5	\$190.4	\$209.2
2033	\$145.2	\$311.2	\$581.5	\$872.8	\$90.8	\$181.4	\$289.5	\$377.1	\$136.5	\$293.3	\$555.8	\$848.0	\$69.1	\$133.9	\$193.5	\$223.6
2034	\$146.0	\$313.8	\$628.2	\$882.0	\$91.2	\$182.8	\$314.6	\$384.5	\$137.3	\$295.8	\$600.4	\$856.8	\$69.4	\$135.0	\$210.2	\$228.0
2035	\$146.7	\$316.2	\$633.7	\$930.5	\$91.5	\$184.2	\$319.1	\$409.3	\$138.0	\$298.0	\$605.8	\$903.6	\$69.7	\$136.0	\$213.1	\$242.6
2036	\$147.3	\$318.3	\$638.8	\$979.0	\$91.7	\$185.4	\$323.4	\$434.4	\$138.6	\$300.0	\$610.7	\$950.5	\$69.8	\$136.9	\$215.7	\$257.4
2037	\$147.7	\$320.1	\$685.4	\$986.7	\$91.9	\$186.5	\$349.0	\$441.6	\$139.1	\$301.8	\$655.3	\$957.8	\$69.9	\$137.7	\$232.4	\$261.4
2038	\$148.0	\$366.2	\$689.7	\$1,034.5	\$92.0	\$213.4	\$353.1	\$467.1	\$139.5	\$345.2	\$659.4	\$1,004.1	\$70.0	\$157.6	\$234.6	\$276.0
2039	\$148.2	\$367.8	\$736.0	\$1,040.8	\$92.0	\$214.4	\$379.0	\$473.9	\$139.7	\$346.8	\$703.8	\$1,010.0	\$70.0	\$158.3	\$251.1	\$279.5
2040	\$194.6	\$369.0	\$739.3	\$1,087.7	\$120.9	\$215.2	\$382.8	\$499.5	\$183.6	\$348.0	\$706.9	\$1,055.2	\$92.0	\$159.0	\$252.8	\$293.9
2041	\$194.8	\$370.0	\$785.0	\$1,134.1	\$121.0	\$215.9	\$408.7	\$525.1	\$183.9	\$349.0	\$750.7	\$1,100.0	\$92.0	\$159.5	\$269.0	\$308.2
2042	\$194.9	\$370.7	\$787.0	\$1,137.9	\$121.0	\$216.4	\$412.1	\$531.2	\$184.0	\$349.6	\$752.7	\$1,103.5	\$92.0	\$159.8	\$270.0	\$310.8
2043	\$195.0	\$416.6	\$788.3	\$1,182.7	\$121.0	\$243.4	\$415.1	\$556.7	\$184.1	\$392.9	\$754.0	\$1,146.7	\$92.0	\$179.8	\$270.7	\$324.6
Total	\$3,678.5	\$7,889.9	\$15,707.9	\$23,055.2	\$2,307.4	\$4,595.2	\$7,757.2	\$9,795.0	\$3,455.5	\$7,430.4	\$15,008.0	\$22,404.6	\$1,757.7	\$3,390.6	\$5,143.7	\$5,763.4

* Excludes roadway and bridge O&M costs



Table 5.15 Annual Toll Net Revenues for Alternatives 5 through 8 (in million nominal dollars)

Year	Alternative 5				Alternative 6				Alternative 7				Alternative 8			
	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll	\$0.50 Toll	\$1.00 Toll	\$2.00 Toll	\$3.00 Toll
2013	\$31.8	\$79.5	\$116.3	\$137.6	\$24.3	\$58.6	\$78.7	\$81.5	\$6.6	\$16.1	\$20.7	\$20.3	\$51.0	\$106.3	\$121.6	\$108.9
2014	\$31.9	\$81.3	\$132.1	\$141.5	\$24.4	\$59.9	\$88.9	\$84.1	\$6.6	\$16.5	\$23.2	\$20.3	\$50.8	\$109.4	\$137.8	\$112.8
2015	\$32.1	\$83.0	\$134.2	\$156.3	\$24.4	\$61.2	\$90.0	\$93.2	\$6.6	\$16.8	\$23.2	\$21.8	\$50.7	\$112.5	\$139.8	\$125.4
2016	\$32.3	\$84.8	\$136.4	\$160.5	\$24.4	\$62.5	\$91.0	\$96.0	\$6.6	\$17.2	\$23.2	\$21.8	\$50.5	\$115.5	\$141.7	\$129.5
2017	\$53.6	\$86.5	\$138.5	\$164.8	\$40.5	\$63.8	\$91.9	\$98.9	\$11.4	\$17.5	\$23.2	\$21.8	\$83.1	\$118.5	\$143.7	\$133.7
2018	\$53.9	\$88.2	\$140.6	\$180.7	\$40.7	\$65.1	\$92.9	\$108.7	\$11.4	\$17.9	\$23.2	\$23.4	\$83.1	\$121.5	\$145.7	\$147.3
2019	\$54.3	\$89.9	\$157.8	\$185.2	\$40.8	\$66.4	\$103.9	\$111.7	\$11.5	\$18.2	\$25.7	\$23.4	\$83.0	\$124.5	\$163.2	\$151.8
2020	\$54.8	\$111.1	\$160.9	\$202.3	\$41.2	\$82.1	\$106.1	\$122.0	\$11.6	\$22.7	\$26.5	\$26.0	\$83.6	\$153.9	\$167.6	\$167.3
2021	\$55.3	\$112.4	\$163.9	\$207.4	\$41.5	\$83.0	\$108.3	\$124.9	\$11.7	\$23.1	\$27.3	\$27.0	\$84.2	\$155.6	\$172.0	\$173.0
2022	\$55.8	\$113.7	\$183.0	\$212.5	\$41.9	\$83.9	\$121.1	\$127.9	\$11.9	\$23.4	\$30.9	\$27.9	\$84.8	\$157.3	\$193.2	\$178.7
2023	\$56.3	\$114.9	\$186.3	\$230.8	\$42.2	\$84.8	\$123.5	\$138.9	\$12.0	\$23.7	\$31.8	\$30.7	\$85.3	\$159.1	\$198.0	\$195.6
2024	\$56.8	\$116.2	\$189.6	\$236.1	\$42.5	\$85.6	\$126.0	\$142.0	\$12.1	\$24.0	\$32.7	\$31.8	\$85.8	\$160.8	\$202.8	\$201.6
2025	\$57.2	\$117.4	\$193.0	\$255.3	\$42.9	\$86.5	\$128.4	\$153.5	\$12.2	\$24.3	\$33.6	\$34.8	\$86.3	\$162.4	\$207.5	\$219.5
2026	\$57.6	\$118.6	\$213.5	\$261.0	\$43.2	\$87.4	\$142.3	\$156.8	\$12.3	\$24.6	\$37.6	\$35.9	\$86.8	\$164.1	\$230.9	\$225.8
2027	\$58.0	\$142.0	\$217.1	\$281.1	\$43.5	\$104.6	\$144.9	\$168.8	\$12.4	\$29.7	\$38.5	\$39.0	\$87.3	\$196.4	\$236.0	\$244.8
2028	\$58.4	\$143.5	\$220.7	\$287.1	\$43.7	\$105.6	\$147.5	\$172.3	\$12.5	\$30.1	\$39.5	\$40.2	\$87.7	\$198.4	\$241.1	\$251.4
2029	\$58.8	\$145.0	\$242.4	\$308.2	\$44.0	\$106.6	\$162.3	\$184.9	\$12.6	\$30.4	\$43.8	\$43.5	\$88.1	\$200.4	\$266.2	\$271.4
2030	\$84.3	\$146.4	\$246.2	\$314.4	\$63.1	\$107.6	\$165.1	\$188.5	\$18.4	\$30.8	\$44.8	\$44.7	\$125.9	\$202.3	\$271.7	\$278.4
2031	\$84.9	\$147.8	\$250.3	\$337.0	\$63.6	\$108.6	\$168.1	\$202.0	\$18.6	\$31.1	\$46.0	\$48.5	\$126.6	\$204.3	\$277.8	\$300.6
2032	\$85.5	\$149.1	\$273.2	\$343.9	\$64.0	\$109.5	\$183.7	\$206.0	\$18.7	\$31.5	\$50.7	\$50.0	\$127.2	\$206.0	\$305.1	\$309.0
2033	\$86.0	\$174.1	\$277.0	\$366.9	\$64.4	\$127.8	\$186.5	\$219.6	\$18.8	\$37.0	\$51.9	\$53.9	\$127.7	\$240.6	\$311.3	\$332.2
2034	\$86.5	\$175.4	\$300.0	\$373.4	\$64.7	\$128.7	\$202.2	\$223.2	\$19.0	\$37.4	\$56.8	\$55.3	\$128.1	\$242.4	\$339.6	\$340.7
2035	\$86.8	\$176.5	\$303.3	\$396.4	\$64.9	\$129.5	\$204.6	\$236.6	\$19.0	\$37.7	\$57.9	\$59.4	\$128.4	\$244.0	\$345.7	\$364.8
2036	\$87.1	\$177.5	\$306.2	\$419.6	\$65.1	\$130.1	\$206.7	\$250.1	\$19.1	\$38.0	\$58.9	\$63.4	\$128.6	\$245.5	\$351.6	\$389.4
2037	\$87.4	\$178.4	\$329.0	\$425.2	\$65.3	\$130.7	\$222.2	\$253.0	\$19.2	\$38.3	\$63.9	\$64.9	\$128.7	\$246.8	\$380.7	\$398.1
2038	\$87.5	\$203.9	\$331.3	\$448.1	\$65.3	\$149.4	\$223.8	\$266.1	\$19.2	\$44.0	\$64.9	\$69.0	\$128.7	\$282.2	\$386.4	\$423.4
2039	\$87.6	\$204.6	\$353.6	\$452.9	\$65.4	\$149.8	\$238.9	\$268.3	\$19.2	\$44.2	\$69.8	\$70.3	\$128.5	\$283.3	\$415.9	\$432.0
2040	\$115.1	\$205.1	\$355.0	\$475.2	\$86.0	\$150.1	\$239.8	\$280.9	\$25.6	\$44.4	\$70.7	\$74.4	\$168.4	\$284.3	\$420.9	\$457.5
2041	\$115.3	\$205.4	\$376.7	\$497.2	\$86.1	\$150.2	\$254.4	\$293.1	\$25.6	\$44.6	\$75.6	\$78.5	\$168.4	\$285.0	\$450.4	\$483.3
2042	\$115.3	\$205.6	\$377.1	\$500.4	\$86.1	\$150.3	\$254.5	\$294.2	\$25.7	\$44.7	\$76.2	\$79.6	\$168.5	\$285.5	\$454.8	\$491.1
2043	\$115.3	\$230.9	\$377.3	\$521.4	\$86.1	\$168.7	\$254.6	\$305.7	\$25.7	\$50.5	\$76.7	\$83.7	\$168.6	\$320.9	\$458.7	\$516.8
Total	\$2,183.6	\$4,408.8	\$7,382.6	\$9,480.5	\$1,636.0	\$3,238.5	\$4,952.9	\$5,653.5	\$473.7	\$930.3	\$1,369.3	\$1,385.2	\$3,264.3	\$6,089.6	\$8,279.5	\$8,555.7

* Excludes roadway and bridge O&M costs



5.4.7 LSIORB PROJECT BENEFITS

Results of the travel demand model analysis indicate that the LSIORB project would result in significant travel time savings for certain through and local trips as compared to the no-build option. Following are some examples of travel time and travel distance savings in 2030 for toll alternative 1 (tolling all bridges) with the \$2.00 base toll rate for passenger vehicles. The origins and destinations mentioned in these examples are shown in **Figure 5.21**. In these examples, travel time savings were converted to monetary terms using values of time of \$9.6 per hour for passenger vehicles and \$33 per hour for trucks in 2007 dollars. The distance savings were expressed as vehicle operating cost savings using approximately \$0.16 per mile for passenger vehicles and \$0.65 per mile for trucks in 2007 dollars.

- Example 1: A worker who lives in Jeffersontown commutes to his job at the Clark Maritime Center in Indiana. Taking the new I-65 bridge will save him 14 minutes (equivalent to \$2.20 savings), which translates to a net saving of approximately \$0.40 after the toll.
- Example 2: A mother from Jeffersontown travels with her daughter to a game at Woerle Field in Jeffersonville, Indiana, after school ends at 3 PM. Taking the new East-End Bridge will result in a 15 minutes time saving. The net savings after the toll will be about \$0.50.
- Example 3: A worker commutes from his home in Clarksville to the Ford Truck plant in Louisville. Using the new East-End Bridge will reduce his travel time by approximately 26 minutes and his travel distance by 4 miles. The net savings after the toll will be about \$2.90.
- Example 4: A truck from Scottsburg, Indiana passes through the Louisville area on its way to Cincinnati via I-65 and I-71. Taking the new East-End Bridge will reduce his trip by approximately 5 miles, resulting in a time saving of 31 minutes. The net savings after the toll will be approximately \$14.80.
- Example 5: A truck from Columbus en route to Edwardsville, Indiana travels via I-71 and I-64. Taking the East-End Bridge will reduce his travel time through the Louisville area by nearly 20 minutes. The net savings will be approximately \$5.00.
- Example 6: A truck delivering cold-rolled steel to the Ford Truck plant in Louisville arrives from Indiana via I-65. Taking the new East-End Bridge will reduce his trip by approximately 7 miles, resulting in a time savings of nearly 32 minutes. The net savings after the toll will be about \$15.70.

Overall, the LSIORB project for toll alternative 1 would result in savings of approximately 30 million vehicle hours in 2030 as compared to the no-build condition.



LOUISVILLE-SOUTHERN INDIANA OHIO RIVER BRIDGES PROJECT
PRELIMINARY TRAFFIC AND REVENUE OPTIONS STUDY

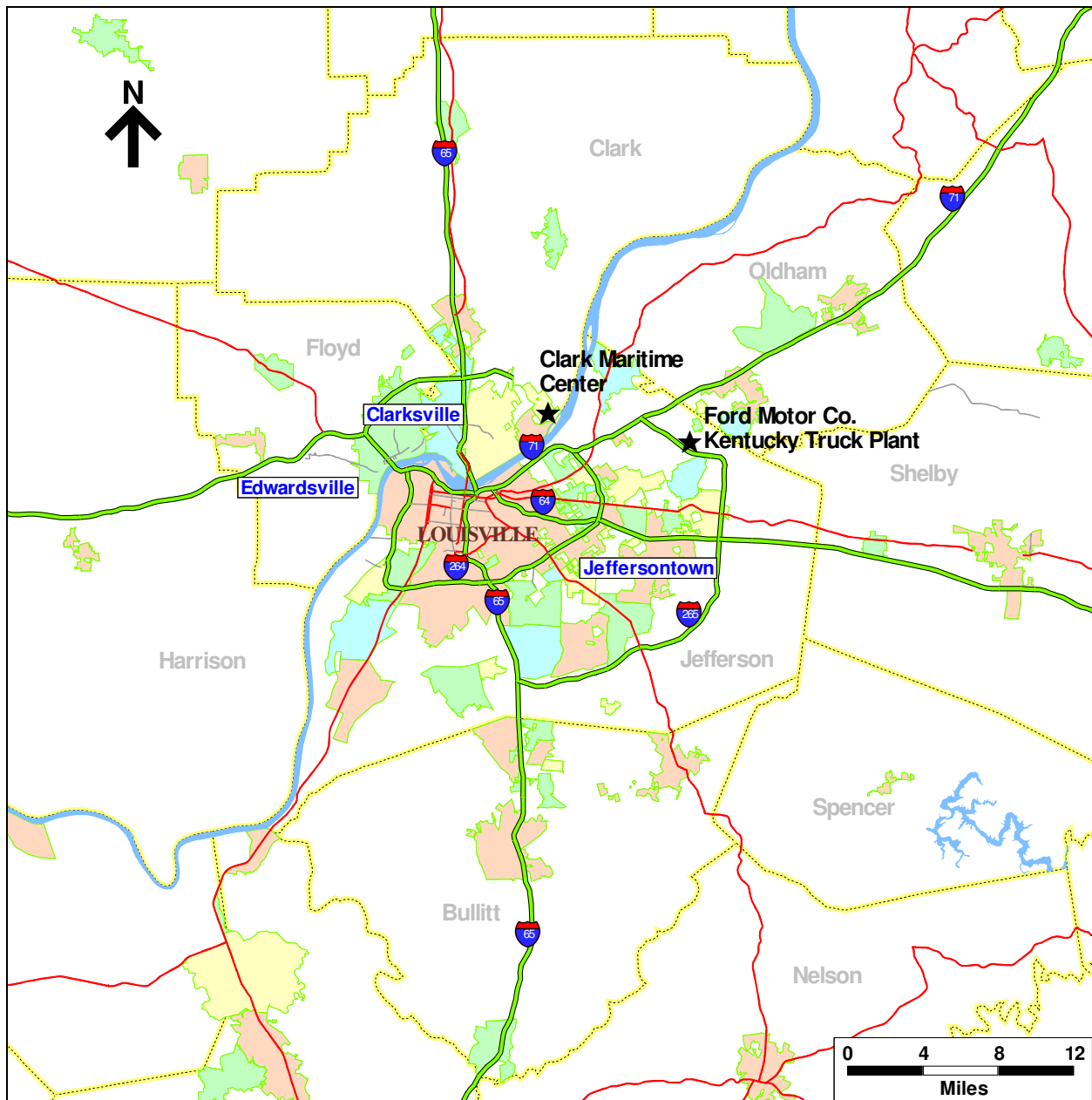


Figure 5.21 O-D Location



LOUISVILLE-SOUTHERN INDIANA OHIO RIVER BRIDGES PROJECT PRELIMINARY TRAFFIC AND REVENUE OPTIONS STUDY

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This study shows that the LSIORB project is expected to result in travel time benefits for the cross-river traffic. For certain trips, travel time savings would be as much as 30 minutes. Tolling options for the project would generate new revenues which may assist in partially funding the project. For example, tolling all bridges with the \$2.00 (2007) base toll rate would generate about \$15.7 billion in net revenue over the 30-year forecasting period beginning in 2013. For the same period and the same toll rate, tolling the East-End Bridge would generate over \$1.3 billion in net revenue.

In this study, current professional practices and procedures were used in the development of traffic and revenue forecasts. It should be noted, however, that there is considerable uncertainty inherent in the determination of future traffic and revenue forecasts on any toll facility. The differences between forecasted and actual observations will exist, caused by events and circumstances beyond the forecasters' control. These differences could be material.

In addition, it should be recognized that the traffic and revenue forecasts presented in this report are intended to reflect the overall estimated long-term trend over a number of years. Actual experience in any given year may vary due to economic condition, short and long-term construction impacts, and other factors. Should KYTC decide to pursue some form of public or private financing for the project, a more detailed comprehensive traffic and revenue study would be required.